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Prioritizing Wholesale Companies Based on Their Financial Performance: A Multi-Criteria Decision Analysis (MCDA) Approach *

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ABSTRACT

Financial markets are considered among the vital indicators that can signalize the development of countries. Shares traded in these markets attract the attention of various financial stakeholders. On the other hand, capital markets, as in many other fields, have been affected by the uncertainty brought by the pandemic. In complex scenarios where many variables come into play, multi-criteria decision-making analyzes (MCDA) are used to make accurate inferences. Wholesale firms listed in Borsa Istanbul, which contribute to the growth rate and export level that Türkiye has achieved in recent years, were analyzed through MCDA methods in this study. Relevant companies were examined with TOPSIS and ELECTRE III methods for 8 periods when the pandemic was felt most intensely. In the study, where 6 different criteria were weighted with CRITIC, companies were ranked according to the scores produced by the aforementioned methods. Notably, both methods identified the same companies as the top-performing alternative for 6 of the 8 periods examined. Since both methods examined produce consistent results, these methods are recommended as a decision support system that financial decision makers can use together in the periods of uncertainty.

Toptan Ticaret Şirketlerinin Finansal Performanslarına Göre Önceliklendirilmesi: Çok Kriterli Karar Analizi (ÇKKA) Yaklaşımı

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ÖZ

Finansal piyasalar ülkelerin gelişmişliklerini gösteren önemli indikatörler arasında sayılmaktadır. Bu piyasalarda işlem gören hisse senetleri, birçok finansal paydaşın ilgisini çekmektedir. Öte yandan, tıpkı birçok alanda olduğu gibi, sermaye piyasalarında da salgının getirdiği belirsizlik etkisini göstermiştir. Birçok değişkenin devreye girdiği karmaşık senaryolarda, doğru çıkarımlar yapabilmek adına çoklu kriterli karar verme analizleri (ÇKKA) kullanılmaktadır. Türkiye'nin son yıllarda yakaladığı büyüme hızı ve ihracat seviyesine katkıda bulunan toptan satış sektöründe faaliyet gösteren ve Borsa Istanbul'da işlem gören firmalar, bu çalışmada ÇKKA yöntemleri aracılığıyla analiz edilmiştir. İlgili şirketler, pandeminin en yoğun hissedildiği 8 dönem için TOPSIS VE ELECTRE III yöntemleri ile incelenmişlerdir. Belirlenen 6 farklı kriterin CRITIC ile ağırlıklandırıldığı çalışmada, şirketler ilgili yöntemlerin ürettiği skorlara göre sıralanmışlardır. Dikkat çekici olarak, her iki yöntem de incelenen 8 dönemin 6'sı için aynı şirketleri en yüksek performans gösteren alternatif olarak belirlemiştir. İncelenen iki yöntemin de tutarlı sonuçlar üretmesi nedeniyle bu yöntemler, belirsizlik sürecinde finansal karar vericilerin birlikte kullanabileceği bir karar destek sistemi olarak önerilmişlerdir.

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INTRODUCTION

In today's developing and changing competitive environment, companies struggle in the global financial system conjuncture where more uncertainty is experienced. This situation brings the concept of risk management to the agenda of investors, partners and creditors, and increases the using frequency of advanced analysis techniques (Zopounidis et al., 2015). In this sense, risk models have been designed to help financial stakeholders and to make more consistent decisions about the future. It is vital to note that, making the right decisions and taking right actions at the right time are critical for decision-makers in the financial system, where the economic costs of wrong decisions can be excessive. Among the models developed for choosing the optimum among many different alternatives, multi-criteria decision analysis (MCDA) applications have an important place (Zavadskas & Turskis, 2011). MCDAs, which perform this optimization process in a practical way, have the capacity to analyze more than one alternative at the same time (De Almeida, 2015).

Financial parties use financial performance to determine to what extent they can achieve the goals they have set regarding the financial instruments they monitor (Öğüt & Tarhan, 2022). In this process, where financial decision support systems are highly improved and preferred in the evaluation of complex financial products, big data analytics, optimization and machine learning have become more accessible and used by financial decision makers (Zopounidis et al., 2018). This evolution observed in research techniques has also changed the approach of researchers to financial problems and increased the preference of MCDA techniques in solving financial problems both on a company and country basis.

The wholesale sector is in a position that grows very rapidly worldwide and has a significant positive contribution to exports, especially for developing countries. Thanks to the technological moves and advances in Europe and Asia, this sector emerges as one of the vital ones that can trigger the growth of economies in these continents (European Commission, 2013). In 2022, a record was broken in Türkiye, reaching an export figure of 254 million dollars with an increase of 12.9% compared to the previous year (Türkiye Exporters Assembly, 2023). The wholesale sector is among the sectors that have an important share in reaching these export figures. There are 11 companies that are traded in Borsa Istanbul and operate in the wholesale sector, at the time of this study. Due to their transaction volume and contribution to the economy, these companies attract the attention of potential creditors and investors. On the other hand, the Covid-19 epidemic created a negative pressure on production, employment, personal and commercial incomes, exports, current account deficit, budget deficit and central government total debt burden in the Turkish economy, as in all economies of the world (Yılmaz, 2022). For the aforementioned reasons, financial performance studies related to this sector gain a special importance.

Performance analysis of 8 wholesale companies listed on BIST, for which sufficient data was available, was made using TOPSIS and ELECTRE III methods, which are known for their practicality and popularity among other methods. The wholesale sector has been particularly preferred because it feeds many other sectors and has a substantial contribution to the Türkiye's exports. In the study, in which 8 periods in the pandemic process were examined, a total of 6 accounting and valuation-based ratios were used and companies were ranked according to their performance for both methods. In the wholesale sector, this study fills an important gap in the literature in terms of examining respective companies in the intense volatility process brought by the pandemic from the perspective of two different methods.

The rest of the study is as follows. In the first section, the brief history of the Turkish capital market and the different crisis periods that affected this market are revealed. In the second section, an overall framework will be demonstrated regarding previous financial performance and MCDA studies. In the third section, the criteria, methods and weighting technique used in this research will be explained. In the fourth section, the analysis results for the two methods will be presented and explained comparatively. In the final section, the findings and results of the study will be discussed, and ideas for future studies will be presented for the analyzed topic.

1. BRIEF CRISIS HISTORY OF BORSA ISTANBUL

Borsa Istanbul, whose foundations were laid in 1866, changed its shape with the laws enacted in 1929 after the establishment of the Republic of Türkiye, and has gained a modern appearance since 1986. While the number of investors in Borsa Istanbul was 2 million as of the end of 2020, this number approached 4 million towards the end of 2022. At the 100th anniversary of the Republic of Türkiye, the 8 million threshold was exceeded.

In 1854, the bond demand that arose from the Ottoman Empire's indebtedness after the Crimean War brought about the need for a capital market and the necessary activities were initiated which led to the establishment of Dersaadet Bond Exchange (İstanbul Menkul Kıymetler Borsası, 1998). Afterwards, some changes and updates were made via regulations in the relevant stock exchange and this new stock exchange was named Esham and Tahvilat Stock Exchange in 1906. With the route drawn by Mustafa Kemal Atatürk at the Izmir 1st Economic Congress towards the establishment of the Republic of Türkiye, the foundations of an economic system that caught the needs of the upcoming age and where modern economic views could be realized were settled. The stock exchange, which moved first from Istanbul to Ankara then to Istanbul again in the period after 1929 and started its operations as the only official stock exchange of Türkiye in 1986, gained its current name as Borsa Istanbul in 2013.

The relevant stock exchange, whose origin and establishment were to respond to the extraordinary needs that emerged after the war, has witnessed different crisis processes. The stock market, which experienced a serious fluctuation after the transition to the floating exchange rate system in February 2001 after the millennium, lost 26% of its value in one trading day (Bektaş & Tekin, 2013). Again, in 2008, the crisis that occurred in the USA after the insecure financial environment created by subprime mortgages had its effect in Türkiye as well as all around the world. Recessions that occurred in Europe with the impact of the relevant crisis caused Türkiye's export figures to decrease and deepened economic fragility (Selçuk & Yılmaz, 2008). A new virus variant, which firstly appeared in Wuhan, China, in the last quarter of 2019, has spread all over the world as of the first quarter of 2020 and has become a global problem. This pandemic had sociological and economic effects as well as biological ones, and investors' behavior was affected.

The performances of companies operating in different sectors in Borsa Istanbul during the crisis processes mentioned briefly above have been examined in the literature. In a study examining the 2001 crisis period, in which the long-term performance of companies in different sectors listed in Borsa Istanbul was investigated, it was determined that the highest long-term returns were realized in companies in the wholesale and retail sectors (Kırkulak, 2010). In another study examining the performance of textile companies during the 2008 crisis, it was observed that the activity and liquidity rates of the relevant companies increased, while the profitability rates remained negative (Karahan & Özduran, 2012). In another study examining the performance of food and textile companies traded in Borsa Istanbul and investigating the effects of the 2008 crisis, it was determined that the food sector secured a positive dynamic despite the crisis, while the textile sector could not avoid the negative effects of the crisis (Emir et al., 2011). In a performance study operating in the manufacturing sector at Borsa Istanbul, where the effects of the pandemic process were examined, the period between 2018 and 2020 was examined (Asker, 2022). It has been determined that the manufacturing sector has a negative performance compared to the pre-pandemic period. For the years 2019 and 2020, the performance of IT companies traded on Borsa Istanbul has been the research subject of another study (Aktaş, 2022). In the research conducted with the PROMETHEE method, it was observed that there was a significant increase in the profitability rates of IT companies during the pandemic period.

The wholesale sector consists of important enterprises that act as a transformer in reaching the export levels targeted by the Republic of Türkiye, especially during its 100th anniversary. Economic crises create distortions in financial ratios and make it more difficult for financial stakeholders to make sound decisions (Koçak et al., 2023). Sectors can be affected by crises to different extents. In particular, the fact that the volatility in capital markets due to COVID-19 is seen as equivalent to the Great Depression of 1929, makes detailed research of this process even more critical (Köse, 2020). For this motivation, in this study, during the uncertainty period when the pandemic was felt at its peak, the

performance of companies operating in the wholesale sector will be examined through two different MCDA methods, and method results and rankings that will aid financial stakeholders will be demonstrated.

2. LITERATURE REVIEW

Financial performance is regarded as a standard for the success of firms and their ability to reach their goals (Karaman, 2009). For this purpose, financial performance is one of the vital indicators that indicates the positions of companies in their sectors and expresses their strengths and weaknesses compared to other companies. The ranking of companies according to their performance can be made by using various ratios obtained from the financial statements. These ratios can be divided into accounting-based ratios, which provide more retrospective information, and valuation-based ratios, which can foreshadow the future of companies (Yalçın et al., 2012).

Specifically, the shocks created by developments such as the Enron scandal in the USA in 2002, the global financial crisis in 2008 and the COVID-19 pandemic, whose volatility effects are still observed in the capital markets nowadays, accelerated the search for the optimum in the capital markets where uncertainty is increasing. At this point, with MCDAs, which appear as a decision support system, the companies in question can be compared with each other, and the strengths and weaknesses of the relevant companies can be revealed, and thus more optimum decisions can be taken by financial decision makers (Köksalan et al., 2011). In fact, the purpose of MCDAs is to provide the most appropriate solution within the preference set of the decision maker, rather than to offer the most perfect solution to a problem (Roy, 1985).

MCDA applications, which are carried out with data obtained from financial statements, have been increasingly preferred in studies conducted in recent years. TOPSIS was preferred as the analysis method in order to examine the financial performance of airline companies operating in Taiwan (Feng & Wang, 2000). In the study, in which 5 companies are ranked according to their financial success, TOPSIS method is proposed for financial performance studies.

The performance of automotive enterprises in Türkiye has been examined with TOPSIS, the preferred analysis method of the study (Yurdakul & İç, 2003). Additionally, it was stated that the financial success ranking of these 5 companies with TOPSIS was consistent.

The overall Turkish economy performance was investigated over different macro variables in a study, and TOPSIS was preferred as the analysis method (Eleren & Karakul, 2008). The country's performance between 1986 and 2006 was listed at the end of the study and 1986 was determined as the most successful year. In addition, cement firms operating in Türkiye have been analyzed with TOPSIS and AHP methods, in terms of their performance (Ertuğrul & Karakaşoğlu, 2009).

The financial performance of 3 banks was examined in a study via TOPSIS, SAW and VIKOR methods, and the financial success ranking of the relevant banks was made according to each method (Wu et al., 2009).

The performance of public banks operating in Türkiye has been analyzed in a study examining 2001 to 2007, with TOPSIS as the preferred method (Demireli, 2010). It has been determined that bank performances include volatility in this examined period, where both local and global crises are experienced.

The financial performance of technology companies operating in Türkiye has been analyzed with the help of TOPSIS method, in another study (Bulgurcu, 2012). The period from 2009 to 2011 was examined annually, and 13 technology firms were ranked in terms of their performance, via the scores calculated by the TOPSIS method for each year. Thus, the best technology companies with higher financial performance scores were identified.

Turkish manufacturing firms have been put to test in terms of their performance in a study with TOPSIS and VIKOR methods (Yalçın et al., 2012). It has been observed that the methods in which companies are ranked according to their financial success give consistent results.

The performance of 14 large-scale holdings operating in Borsa Istanbul has been examined in a research with TOPSIS method (Kazan & Özdemir, 2014). CRITIC was used as an objective weighting technique in the aforementioned study, and the holdings were ranked according to their financial success.

The performance of banks in Serbia has been analyzed in a study with TOPSIS method, and the financial success ranking of 35 banks was made from 2005 to 2010 (Mandic et al., 2014).

The financial performance of 24 real estate investment trusts operating in Türkiye in a time frame between 2012 and 2013 has been analyzed with TOPSIS as the research method and ANP as the weighting technique, in a study (Önder et al., 2014). Moreover, companies were ranked based on their financial success scores calculated according to the TOPSIS method.

In a study examining the financial performance of 25 real estate investment trust companies between 2011 and 2014, the TOPSIS method was preferred (İslamoğlu et al., 2015). In addition, the companies examined were ranked according to their financial successes.

The financial performance of 4 thermal power enterprises operating in China has been analyzed with TOPSIS as the sole research method and ANP as the weighting technique, in a study (Zhao & Li, 2015). The companies examined were ranked according to their financial success scores, at the end of the study.

In another research examining the financial performance of 4 banks operating in Iran, analyzes were carried out using TOPSIS and VIKOR methods (Beheshtinia & Omidi, 2017). The debt ratio has come to the fore as one of the most important criteria among the preferred criteria, in the aforementioned study.

TOPSIS stands out among the methods used in a study in which the financial performance of tourism firms listed in Borsa Istanbul are analyzed (Aytekin, 2019). The financial performance of 14 cement firms listed in Borsa Istanbul have been analyzed from 2015 to 2017 with TOPSIS method, in a study (Kızıl, 2019). In the study using 4 criteria, the results produced by TOPSIS were compared with the market-to-book ratios of the companies. As a result, a significant and strong relationship was detected between the final method results and market-to-book ratios of cement companies in 2015 and 2017.

The ELECTRE III method was used in a performance study on companies traded on the FTSE 140 index of Athens Stock Exchange (Xidonas et al., 2009). In addition, a financial performance study was applied to 5 retail companies operating in Türkiye and the related companies were examined based on their financial statements between 2008 and 2010 (Ergül & Seyfullahoğulları, 2012). Besides, success rankings of the companies were made according to their financial performance scores calculated with the ELECTRE III method.

3. METHODOLOGY

While financial ratios are used with various advanced models in financial performance analysis, new methods are still being developed in order to aid financial stakeholders in analyzing uncertain processes (Drury, 1981). Artificial neural networks, MCDAs and machine learning are among the methods frequently used in this sense. In the case of MCDAs, the diversity and richness of use of these methods and their statistically strong results have attracted the attention of researchers and financial decision makers (Silva & Figueiredo, 2018).

Debt ratio is used in the performance studies as a parameter that demonstrates how much the company uses external financing compared to its capital (Abdel-Basset et al., 2020). In order to observe how efficiently the liabilities are used in the wholesale industry, the relevant ratio is included as the only cost-criteria in this study. One of the benefit-based parameters that attract the most attention of investors, partners and creditors is undoubtedly the profitability of the company. The extent to which this profitability develops is revealed by the net profit growth (NPG) rate and is implemented in financial performance studies (De Almeida et al., 2015). Return on assets (ROA) is the ratio that measures how much profit the company makes compared to its total assets. ROA, which is a widely accepted and well-

established ratio, is frequently preferred in financial performance studies (Aldalou & Perçin, 2020). The ratio that measures how much market value the company can create compared to its equity is the market-to-book (M-to-B) ratio. This ratio, which measures the value creation capacity of the company, is especially preferred in financial performance studies (Bağcı & Yerdelen Kaygın, 2020). Market value added (MVA) is the ratio that shows how well the company can create value for its shareholders by managing the capital invested. It is used in financial performance studies because it can also show the management performance of company managers (Bayrakdaroğlu & Yalçın, 2012). The ratio that measures the amount of return corresponding to each stock owned by investors is called earnings per share (EPS). Since it is one of the vital ratios that measure the efficiency of the company, it is used in financial performance studies (Shaverdi et al., 2014).

3.1. Elimination and Choice Expressing Reality (ELECTRE III)

ELECTRE III, which is one of the most widely used method among outranking type of MCDAs, is used to solve different real-life problems and is more frequently preferred for solving problems involving especially uncertainty (Figueira et al., 2010, Girubha et al., 2016). The calculation stages used in the application of this method are given below.

The created decision matrix is converted into a concordance matrix, in accordance with the following equations.

$$C(a,b) = \sum_{j=1}^{n} w_j C_j(a,b) \tag{1}$$

$$\text{where } C_j(a,b) = \begin{cases} 1 & if\ F_j(b) - F_j(a) \le Q_j \\ 0 & if\ F_j(b) - F_j(a) > P_j \\ \frac{P_j - [F_j(b) - F_j(a)]}{P_j - Q_j} & if\ Q_j < F_j(b) - F_j(a) \le P_j \end{cases} \tag{2}$$

After the concordance matrix, the discordance matrix is created using the following equation.

$$D_j(a,b) = \begin{cases} 1 & if\ F_j(b) - F_j(a) > V_j \\ 0 & if\ F_j(b) - F_j(a) \le P_j \\ \frac{F_j(b) - F_j(a) - P_j}{V_j - P_j} & if\ P_j < F_j(b) - F_j(a) \le V_j \end{cases} \tag{3}$$

Then, the credibility matrix is created using the following equation.

$$S(a,b) = \begin{cases} C(a,b) & if\ D_j(a,b) \le C(a,b) \forall j \\ C(a,b) \prod_{j \in J(a,b)} \frac{1 - D_j(a,b)}{1 - C(a,b)} & otherwise \end{cases} \tag{4}$$

Afterwards, λ_0 is determined by applying the following equation.

$$\lambda_0 = \max S(a,b) \qquad where\ a,b \in S \tag{5}$$

Ultimately, by determining λ_1 as shown below, final method results are generated.

$$\lambda_1 = \max S(a,b) \qquad where\ (S(a,b) < \left(\left(\lambda_0 - s(\lambda_0)\right)\right) \in S \tag{6}$$

$$S(\lambda_0) = \alpha + \beta\lambda \tag{7}$$

The scores obtained as a result of using equation (7) are listed in a descending order.

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

The TOPSIS method is the most popular of the compromise type of MCDAs. Alternatives are ranked according to the proximity to the positive ideal solution and the distance to the negative ideal solution (Hwang & Yoon, 1981). According to the method, the positive ideal solution is considered to have the best values for the problem studied, while the negative ideal solution is considered to have the

worst values for the researched problem (Chamodrakas et al., 2011). The steps of the method are outlined below.

The created decision matrix is normalized using the following equation. Thus, the normalized decision matrix is obtained.

$$F_{ij} = \frac{f_{ij}}{\sqrt{\sum_{i=1}^{m} f_{ij}^2}} \tag{8}$$

The weights calculated with the preferred weighting technique are multiplied by the normalized values to create a weighted and normalized decision matrix.

$$v_{ij} = F_{ij} \times w_j \tag{9}$$

In this method, the distance to positive and negative solutions is of critical importance in producing the final results. The ideal solutions at these two extremes are calculated using the following equations.

$$A^+ = \left\{\left(Max_i(v_{ij}) \,\middle|\, j \in J\right), \left(Min_i(v_{ij}) \,\middle|\, j \in J'\right) \,\middle|\, i \in 1,2,\dots,m\right\} = \left\{v_1^+, v_2^+, v_3^+, \dots, v_j^+, \dots, v_n^+\right\} \tag{10}$$

$$A^- = \left\{\left(Min_i(v_{ij}) \,\middle|\, j \in J\right), \left(Max_i(v_{ij}) \,\middle|\, j \in J'\right) \,\middle|\, i \in 1,2,\dots,m\right\} = \left\{v_1^-, v_2^-, v_3^-, \dots, v_j^-, \dots, v_n^-\right\} \tag{11}$$

Then, the distances to the positive and negative ideal solutions calculated above are determined.

$$S_{i+} = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_j^+\right)^2} \qquad i = 1,2,3,\dots,m \tag{12}$$

$$S_{i-} = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_j^-\right)^2} \qquad i = 1,2,3,\dots,m \tag{13}$$

The relative proximity to the ideal solution, which indicates the final score of the method, is calculated through the equation given below.

$$C_i = \frac{S_{i-}}{S_{i-} + S_{i+}} \tag{14}$$

As a result of this method, the final scores calculated for the alternatives are ranked from largest to smallest, in order to determine the best alternative.

3.3. Criteria Importance Through Intercriteria Correlation (CRITIC)

CRITIC technique determines criterion weights based on standard deviation and correlation calculations (Diakoulaki et al., 1995). The fact that it is objective and the criteria weights are calculated completely mathematically is the reason why it is preferred especially in financial performance studies. The calculation stages of this technique used in relation to the problem to be solved are given below.

As in the above methods, first the decision matrix is created. Each value is then normalized using the equation below.

$$r_{ij} = \frac{x_{ij} - x_j min}{x_j max - x_j min} \tag{15}$$

The objective evaluation of this method is related to the purely mathematical calculation of the weights. At this stage, correlation density is determined by standard deviation and correlation analysis.

$$C_j = \sigma_j \sum_{i=1}^{m}(1 - r_{ij}) \tag{16}$$

Finally, the correlation densities calculated above are normalized. In this way, the weight of each criterion is determined.

$$w_j = \frac{c_j}{\sum_{i=1}^{m} c_i} \quad (17)$$

The calculated criterion weights are integrated separately into each preferred method for subsequent analysis.

4. FINDINGS and RESULTS

TOPSIS and ELECTRE III methods were used in this study, which examined the performance of 8 wholesale companies traded in Borsa Istanbul for the 8 quarters during the pandemic period. For the analyzes carried out on the 6 criteria based on accounting and valuation explained above, first of all, the dynamic values of the relevant criteria were determined and accordingly, decision matrices to be used in the analyzes were created for each period. The relevant decision matrices are given in Table 1 below.

Table 1. *Decision matrices used in all quarters examined in this financial performance study*

	ROA	EPS	NPG	Debt	M-to-B	MVA	
ARZUM	-0.28683	-0.17974	-0.76982	0.497877	-0.02598	-0.01262	
DOAS	0.39711	0.398846	-0.96255	-0.18216	0.612159	1.844507	
INTEM	-0.36447	-0.47861	7.330953	-0.11114	0.974249	0.873167	
KUVVA	-0.48767	0.606213	12.80212	3.296044	0.001978	0.019866	2020/IV
PSDTC	0.533463	0.471259	-0.84188	0.089299	0.404946	0.423411	
SANKO	-0.23028	-0.02645	-0.75648	-0.55722	-0.21197	-0.08972	
SELEC	0.090989	0.213357	-0.07922	0.130397	0.545024	1.634277	
TGSAS	0.615309	0.444993	-0.05194	-0.12548	0.458804	0.808077	
ARZUM	-0.37828	-0.29095	2.601126	-0.06847	-0.25614	-0.16698	
DOAS	-0.65477	-0.60838	-0.81989	0.3515	0.0263	-0.04631	
INTEM	0.346357	0.704178	-0.98046	0.086706	0.102597	0.296334	
KUVVA	-2.13905	-2.04991	-20.0205	0.09277	0.257425	0.07418	2021/I
PSDTC	-0.60057	-0.5551	-51.1061	-0.00747	0.188464	0.400338	
SANKO	-0.62952	-0.57512	1.516607	1.20684	0.392086	0.856661	
SELEC	-0.54054	-0.51684	-1.95497	-0.03808	-0.29714	-0.47511	
TGSAS	0.294412	0.235001	-9.6553	-0.11486	0.312327	0.540126	
ARZUM	0.430499	0.529807	-0.84536	0.074368	-0.23038	-0.28698	
DOAS	1.188203	1.178425	0.261985	-0.26978	-0.28387	-0.30149	
INTEM	1.244606	1.843116	13.35553	-0.00298	-0.39735	-0.25105	
KUVVA	-0.60161	-0.57337	-0.93634	0.05043	-0.14636	-0.12404	2021/II
PSDTC	0.65821	0.701371	-0.06974	0.184029	-0.01186	-0.14207	
SANKO	0.779638	0.689284	-0.08544	-0.27611	-0.29362	-0.46101	
SELEC	1.101191	0.931388	1.882796	-0.18378	-0.23696	-0.57408	
TGSAS	0.343435	0.681177	-0.48797	0.199511	-0.36634	-0.43955	
ARZUM	-0.2039	-0.17479	-1.34859	0.112579	0.12376	0.122294	
DOAS	0.513599	0.417746	-0.75788	-0.27784	0.215671	0.642237	
INTEM	0.765585	0.821786	0.230267	-0.20126	-0.32455	-0.1653	
KUVVA	11.38336	3.509125	1.734204	-0.6903	-0.05612	-0.00828	2021/III
PSDTC	0.302146	0.509646	-0.35775	0.052776	-0.06334	0.014893	
SANKO	0.187002	0.196868	-1.32954	-0.03085	-0.01638	-0.02147	
SELEC	0.09849	0.314287	0.13977	0.2545	-0.01742	-0.04298	
TGSAS	0.332333	0.459164	0.05349	0.042831	0.301591	0.527463	
ARZUM	0.386259	0.535748	-2.40971	-0.04119	-0.27666	-0.2826	
DOAS	0.430719	0.853786	0.795259	-0.17526	-0.10333	0.197117	
INTEM	0.487843	0.164237	1.575194	-0.29919	1.454974	1.777187	

KUVVA	-1.11651	-1.14473	-0.83325	-0.32509	-0.41044	-0.16146	2021/IV
PSDTC	0.275238	0.776641	0.512252	0.150216	0.019988	0.246406	
SANKO	1.060492	2.288599	-12.1504	2.845084	-0.16893	-0.23975	
SELEC	0.165244	0.282122	0.172779	0.077882	0.340269	1.819391	
TGSAS	0.550061	0.396811	-0.04322	-0.15838	-0.13178	-0.12235	
ARZUM	-0.40528	-0.32462	-0.17424	-0.06786	-0.13172	-0.04768	
DOAS	-0.65214	-0.5699	0.177354	0.569294	0.376854	0.585518	
INTEM	-0.39279	0.07725	-0.40753	0.165439	-0.49586	-0.2447	
KUVVA	-4.33865	-3.48888	-1.4339	-0.42691	0.618958	0.501266	2022/I
PSDTC	-0.61066	-0.55461	0.002138	-0.03593	-0.21069	-0.13233	
SANKO	-0.8303	-0.76868	-0.70517	0.834199	-0.01663	0.002286	
SELEC	-0.47577	-0.40535	0.633862	0.015908	-0.11931	-0.20883	
TGSAS	-0.80652	-0.7202	-1.01277	0.382133	-0.16235	-0.18993	
ARZUM	0.126842	0.264862	-0.73298	0.198041	0.009205	-0.00757	
DOAS	1.386637	1.759621	0.449224	-0.31533	-0.08973	0.265521	
INTEM	0.786907	1.700368	-0.05934	-0.06316	-0.50894	-0.26806	
KUVVA	-1.00819	-1.02268	2.480944	4.885468	0.243327	1.805315	2022/II
PSDTC	0.544107	0.92823	0.262492	0.494248	0.043478	-0.10754	
SANKO	0.889085	1.341467	1.103571	-0.21755	-0.26043	-0.60072	
SELEC	0.537718	0.675498	-0.27414	0.118805	0.244546	0.774444	
TGSAS	0.791232	1.181902	-6.92157	0.172219	-0.06309	-0.05999	
ARZUM	-0.36431	-0.19006	-0.24236	0.397777	0.723523	1.157764	
DOAS	0.679118	0.975965	0.579508	-0.3294	0.390233	1.332998	
INTEM	0.507975	0.398432	-0.27733	-0.28137	0.343805	0.725878	
KUVVA	-0.62449	-0.60518	-0.0588	0.082193	0.51021	0.525698	2022/III
PSDTC	0.555464	0.569956	0.0706	-0.15769	0.343672	0.749791	
SANKO	0.36285	0.385484	0.29682	-0.02938	1.030253	7.531858	
SELEC	0.559726	0.807358	0.927756	0.015657	0.681452	1.858528	
TGSAS	0.30176	0.462771	0.012593	0.066105	0.470824	0.852518	

In this study, CRITIC weighting technique was preferred in order to make an objective and unbiased analysis without giving place to subjective expert opinion. The criteria weight results of this technique, which takes its strength only from mathematics and determines the weights according to the standard deviation and correlation between the criteria, are given in Table 2 below. Accordingly, it was determined that debt ratio, M-to-B and MVA ratios were the parameters that affected financial performance the most in the wholesale sector, in particular for the 8 periods in the pandemic process where uncertainty increased.

Table 2. *Criteria weights calculated with the CRITIC weighting technique for all quarters*

	2020/IV	2021/I	2021/II	2021/III	2021/IV	2022/I	2022/II	2022/III
ROA	0.152086	0.117353	0.130933	0.133	0.159187	0.165221	0.136876	0.1454
EPS	0.172928	0.110511	0.11285	0.122863	0.186995	0.152327	0.157979	0.128063
NPG	*0.249889*	0.193151	0.143845	0.149667	0.163752	0.1311	0.160701	0.14896
Debt	0.161428	*0.217878*	*0.205428*	0.126957	*0.190162*	*0.176736*	0.159952	*0.17401*
M-to-B	0.125697	*0.205954*	*0.203469*	*0.224546*	0.126194	*0.172256*	*0.192893*	*0.23461*
MVA	0.137973	0.155154	*0.203476*	*0.242967*	0.173709	*0.202359*	*0.191599*	*0.168957*

The final financial performance results of the companies according to the ELECTRE III method obtained after applying the formulas (1) through (7) above to the decision matrices are shown in Table 3. Doğuş Automotive (DOAS) found to be the best performer in the first quarter of the analysis. Afterwards, TGS Foreign Trade (TGSAS), Intema Construction (INTEM), Kuvva Food (KUVVA), once again (INTEM), once again (DOAS), Selçuk Pharmaceutical Warehouse (SELEC) and Sanko Import Export (SANKO) companies showed the highest performance in the following quarters respectively. According to the ELECTRE III method, in the analysis of all quarters as a single period, DOAS was determined as the company with the highest financial performance of the 2-year period examined.

Table 3. *Scores calculated for each quarter via ELECTRE III method*

	2020/IV	2021/I	2021/II	2021/III	2021/IV	2022/I	2022/II	2022/III	Overall
ARZUM	-5.26022	-0.70478	-2.2861	-1.16598	-1.56605	1.118373	-1.26599	-4.48319	-4.97039
DOAS	*3.463571*	-1.23766	2.848564	4.50277	0.537511	*4.843507*	2.979436	2.818138	*6.098146*
INTEM	-0.21242	4.280519	*3.869167*	-3.61061	*5.437696*	-1.58803	-1.40295	-1.04202	3.290903
KUVVA	0.306732	-1.95296	-0.73271	*4.836931*	-5.23682	-0.11176	-0.9418	-5.18899	0.942271
PSDTC	1.509544	-2.65939	1.625173	-2.4098	0.473335	0.05264	0.907785	-0.26695	-2.24417
SANKO	-4.23128	-0.85705	0.746042	-3.3495	-3.83962	-2.23497	-0.35884	*5.638049*	-4.38037
SELEC	1.546158	-2.21579	0.02983	-2.94109	4.643868	0.988977	*3.609381*	4.063467	0.81601
TGSAS	2.877904	*5.347101*	-6.09997	4.137282	-0.44992	-3.06874	-3.52703	-1.5385	0.447597

After using the formulas (8) through (14) in the decision matrices of this study, the final TOPSIS financial performance results of the companies for each period were obtained. These results are demonstrated in Table 4 below. In the first quarter analyzed, TGSAS is found to be the best performer among other wholesale firms. Once again TGSAS, INTEM, TGSAS, INTEM, DOAS, SELEC and SANKO companies showed the highest performance in the following quarters respectively. According to the TOPSIS method, in the analysis of all quarters as a single period, the company with the highest financial performance of the 2-year period examined was again determined as DOAS.

Table 4. *Scores calculated for each quarter via TOPSIS method*

	2020/IV	2021/I	2021/II	2021/III	2021/IV	2022/I	2022/II	2022/III	Overall
ARZUM	0.313673	0.572383	0.334054	0.396351	0.54205	0.545714	0.55473	0.175414	0.286252
DOAS	0.532646	0.586348	0.587161	0.601804	0.621146	*0.669313*	0.653684	0.642388	*0.609446*
INTEM	0.507091	0.749665	*0.603837*	0.225272	*0.721378*	0.435933	0.48267	0.502779	0.553777
KUVVA	0.519456	0.563113	0.340965	0.565679	0.419319	0.576703	0.591608	0.245167	0.536936
PSDTC	0.509202	0.573472	0.400505	0.299417	0.60342	0.50747	0.593597	0.512304	0.302387
SANKO	0.393534	0.581119	0.538937	0.296724	0.466874	0.422054	0.523573	*0.666861*	0.323914
SELEC	0.486091	0.520529	0.53273	0.323283	0.643627	0.527753	*0.723565*	0.607992	0.380791
TGSAS	*0.542041*	*0.85111*	0.220902	*0.610189*	0.579869	0.406092	0.471127	0.408445	0.436618

Examining the top performing companies above, it was observed that the two methods produced mutual best performers in 6 of the 8 periods analyzed. In addition, the company with the highest financial performance in the entire 2-year period is the same for both methods. From this perspective, these two methods are recommended for financial decision makers in an environment of uncertainty.

DISCUSSION and CONCLUSION

In modern market conditions where competition is constantly intensifying and uncertainties are experienced, financial performance studies play a critical role in helping financial stakeholders determine their route more explicitly. In this sense, MCDA methods have become more preferred due to their practicality and richness to meet developing and changing demands. The pandemic brought by the COVID-19 virus, which broke out in the last quarter of 2019 and affected the whole world in the first quarter of 2020, has taken its toll on capital markets as well. In this process, where volatility

increased compared to before, the buying and selling behavior of shareholders was also affected, resulting in serious declines in the capital markets, especially in the first quarters of the pandemic.

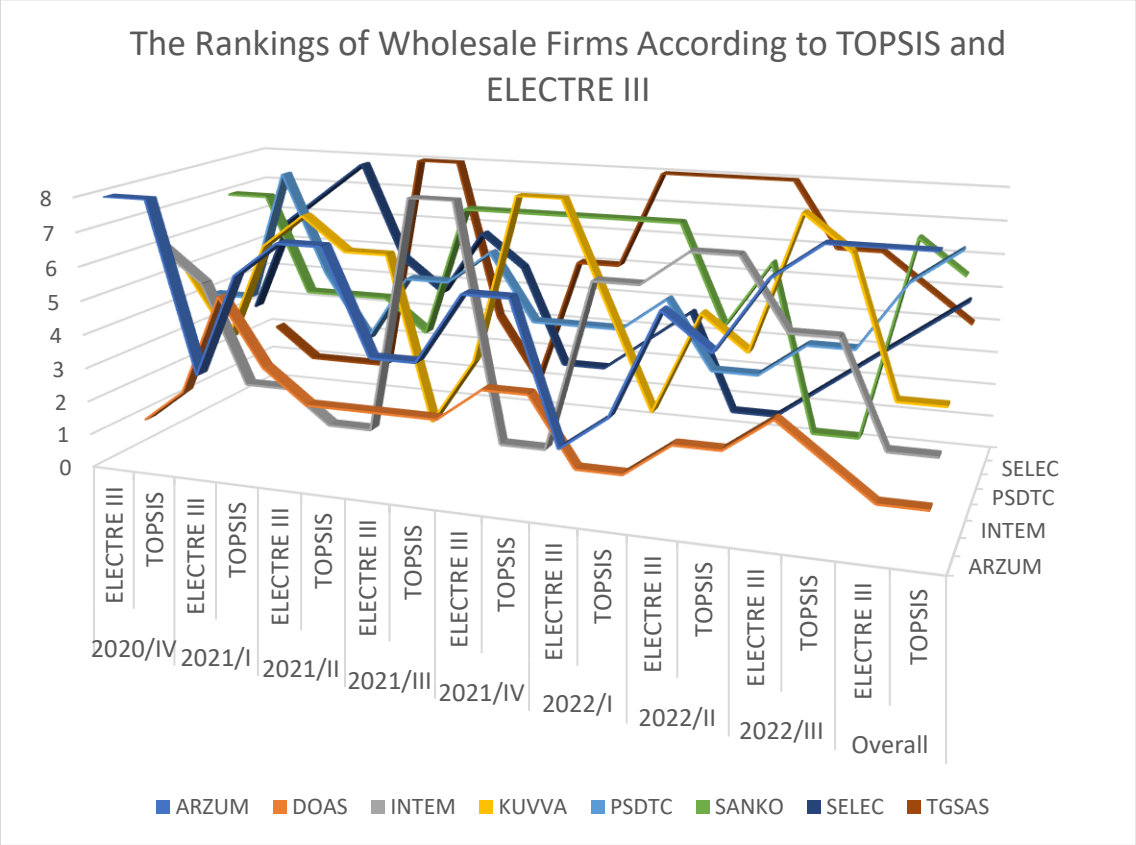

Figure 1. *The Final TOPSIS and ELECTRE III rankings of wholesale companies for each period analyzed*

TOPSIS and ELECTRE III methods were used in the study, in which the performance of 8 companies operating in the wholesale sector in Borsa Istanbul was examined for the 8 quarters during the pandemic. The financial performance ranking of these 8 companies is shown in Figure 1 for each method. As can be seen, both methods showed mutual companies as best performers in 6 of the 8 analyzed quarters and in the entire analysis period, in terms of financial performance. In this regard, both methods have been proposed to financial decision makers who are in the decision-making phase during times of uncertainty.

The limitation of this study is that it covers 8 periods during the pandemic period through 2 MCDA methods. Additionally, this study was conducted only on wholesale companies traded on Borsa Istanbul. Examining wholesale companies traded in developed country markets as well as developing country markets will increase the depth of the study.

In future studies, other methods can be added to the analysis, and the evolution of companies' financial performance rankings can be examined. By examining the financial performances of wholesale companies of different countries during the pandemic period, the characteristics of different methods can be observed in more detail. In addition, with a study to be executed after the pandemic, the financial performances of wholesale companies in the pre-pandemic, during the pandemic and post-pandemic processes can be revealed comparatively.

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