

Analysis of The Financial Performances of Real Estate Investment Trusts Critic Aras and Copras Methods: The Case of Bist *

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ARTICLE INFO	ABSTRACT
<p>Keywords: Financial Performance Real Estate Investment Trusts CRITIC ARAS CORPAS</p> <p>Received 26 April 2023 Revised 29 October 2024 Accepted 5 November 2024</p> <p>Article Classification: Research Article</p>	<p>Purpose – It was aimed to analyze the financial performances of Real Estate Investment Trust companies whose stocks have been traded in Borsa Istanbul over the years 2017-2021.</p> <p>Design/methodology/approach –In the research study; the criteria weights of financial data were determined in the analysis employing the CRITIC Method, one of the Multi-Criteria Decision-Making Techniques. ARAS and COPRAS Methods were employed to rank the financial performances of the Real Estate Investment Trust companies.</p> <p>Findings – In the analysis; while the criterion with the highest weight in determining the criterion weights of financial ratios with the CRITIC method was the Gross Operating Profit Margin in 2017, 2018, 2020, and 2021, it was determined as the Net Sales Growth for 2019. While the lowest weighted criterion was the Return on Assets for 2017 and 2021, it was determined as the Return on Equity for 2018, 2019, and 2020. In the ARAS method, the companies with the best financial performance year by year were PAGYO, PAGYO, AVGYO, AVGYO, and TDGYO, respectively; whereas the companies with the worst financial performance were PEGYO, NUGYO, NUGYO, PEGYO, and DGGYO, respectively. In the evaluation of the financial performances of the Real Estate Investment Trust companies employing the COPRAS method, it was determined that the companies with the best financial performance were PAGYO, PAGYO, AVGYO, AVGYO, and TDGYO, respectively; whereas the companies with the worst financial performance were PEGYO, NUGYO, PEGYO, AKFGY, and DGGYO, respectively.</p> <p>Discussion – The results of the study supported the use of Multiple Criteria Decision-Making techniques by financial information users to calculate the financial performance of businesses. Additionally, the research found that the Real Estate Investment Trust companies with high profitability and low debt ratios also had high financial performance rankings.</p>

1. INTRODUCTION

The word “gayrimenkul,” (real estate) which has Arabic roots, is defined in the Dictionary of Turkish Language Association as a counterpart to the word “taşınmaz,” which refers to immovable property. “Taşınmaz” is defined as goods that are fixed in their location and cannot be moved to another place due to their inherent qualities (Türeoğlu, 2008: 12). In colloquial language, the term “gayrimenkul” is also used to refer to land and building components, such as land and housing, whose ownership is determined by a land registry (Saraç, 2012: 1). Demand for real estate, or immovable property, initially arose from the need for shelter and protection from external dangers, but over time, it evolved into an investment and income-generating opportunity for individuals and organizations. In addition to these developments, rapid population growth in countries and migration from rural areas to cities have revealed a housing shortage and further increased the demand for real estate. Furthermore, the traditional nature of real estate investment and its ability to provide high returns have made it a preferred choice for individuals and organizations. Therefore, it is believed that the desire of savers to invest in real estate will never lose its importance.

To invest in the real estate sector and provide the required high amount of funds, Real Estate Investment Trusts (REITs) have emerged. REITs are organizations that create a portfolio using the funds obtained from investors in transactions permitted by the Capital Markets Board (SPK) and aim to manage this portfolio (Tuncel, 1997: 9-10). In other words, REITs are publicly traded portfolio management companies with a large number of shareholders and capital structure, whose shares are traded on the BIST, and that are established

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as joint-stock companies subject to the rules determined by the SPK (Şahin, 2010: 29). In short, REITs are organizations that provide financing for real estate investments by obtaining funds from the capital markets in which they operate to meet the required sources. With REITs, small savers have the opportunity to invest in large real estate investments, and investors benefit from all kinds of cash inflows, diversification, and long-term capital appreciation (Üreten, 2007: 122). The determination of the financial performance of REITs is crucial for many financial information users such as business owners, managers, and investors.

Performance is a measure that guides companies in achieving their defined goals, maintaining success, and achieving continuity in success (Karaman, 2009: 411). Financial performance, on the other hand, is an indicator that allows companies to see the situation they have targeted and achieved, continue to maintain successful situations, see what they need to do to achieve their goals in case of failure and continue their existence. When analyzing the financial performance of companies, they can examine their situation both periodically and compare themselves with other companies (Atukalp, 2019: 216). In addition, the efficiency with which companies carry out their activities is also revealed by financial performance (Topal, 2021: 534). Companies that can maintain their financial performance at a high level are in an advantageous position compared to their competitors in both local and global markets, thus being able to sustain their success and existence more solidly. Upon analyzing their financial performance, companies examine various criteria based on which they perform their analysis. Upon examining the literature, it is seen that Multi-Criteria Decision Making (MCDM) methods, which generally provide the opportunity to analyze by taking into account a large number of criteria, are used to determine the financial performance of companies (Karcioğlu et al., 2020: 361).

Throughout the human life cycle, after satisfying physiological needs such as food and drink, individuals require safety needs, such as protection from dangers and the need for shelter (Maslow, 1958). In this context, the demand for real estate—also referred to as immovable property—initially arises from the need for shelter and protection from external threats. However, over time, this demand evolves into an investment opportunity and a means of generating income for both individuals and institutions. The development of the real estate sector, along with its sub-sectors, plays a significant role in fostering economic growth, especially by contributing to employment. As is well known, Real Estate Investment Trusts (REITs) are financial instruments that meet the funding needs of the real estate sector. REITs serve as alternative investment tools in the portfolios of both individual and institutional investors. With the emergence of REITs as financial instruments providing capital, the financial success of REIT companies has become a matter of particular importance, especially for financial information users. Accordingly, the purpose of this study is to analyze the financial performance of REIT companies listed on Borsa Istanbul during the period 2017-2021. The analysis will be conducted using multi-criteria decision-making techniques, including CRITIC, ARAS, and COPRAS methods. When the analysis results are evaluated as a whole, it is determined that the most effective financial ratios in determining criterion weights with the CRITIC Method are the Gross Operating Profit Margin and Return on Equity. When the results obtained with the ARAS and COPRAS methods were compared, it was found that the financial performance success rankings showed a significant similarity. By scanning both national and international literature, commonly used and less frequently used ratios were combined, and a different perspective from other studies in the literature was created.

2. LITERATURE REVIEW

The aim of the literature review is to examine previous national and international studies related to the research topic of financial performance and to identify gaps within the existing literature.

Table 1. Literature Review

Author(s)	The Sample of the Study and Its Purpose	The Analysis Method Employed in the Study
Feng and Wang (2000)	The financial performance of airline companies operating in Taiwan in 1997	Grey Relational Analysis and TOPSIS Method
Voulgaris et al. (2000)	The financial performance of SMEs operating in Greece between 1988 and 1996	UTADIS Method

Makni et al. (2009)	Examining the relationship between corporate social performance and financial performance of publicly traded companies in Canada over the period 2004-2005	Granger Analysis	Causality
Usman and Khan (2010)	The financial performance of Islamic and conventional banks in Pakistan between 2007 and 2009	T- Test	
Alhatip and Harasheh (2012)	The financial performance of commercial banks listed on the Palestine Stock Exchange between 2005 and 2010	Correlation and Multiple Regression Analysis	
Atmaca (2012)	The financial performance of sports service companies listed on the Stock Exchange between 2003 and 2010	TOPSIS Method	
Akyüz and Kaya (2013)	The financial performance of non-life insurance companies and life/pension companies in Turkey between 2007 and 2011	TOPSIS Method	
Borhan et al. (2014)	The financial performance of Lyondell Basell industries operating in various parts of the World between 2004 and 2011	Ordinary Least Squares Method	
Ergül (2014)	The financial performance of companies operating in the BIST tourism sector between 2005 and 2012	ELECTRE and TOPSIS Methods	
Gugong et al. (2014)	The impact of ownership structures on the financial performance of insurance companies operating on the Nigerian Stock Exchange between 2001 and 2010	Panel Data Analysis	
Pal (2015)	The financial performance of the Indian automobile industry between 1999 and 2014	Factor Analysis and Multiple Regression Analysis	
Bülbül and Köse (2016)	The financial performance of companies operating in the Turkish insurance sector between 2010 and 2013	PROMETHEE Method	
Şişman and Doğan (2016)	The financial performance of deposit banks operating on BIST between 2008 and 2014	AHP and Fuzzy MOORA Methods	
Kandemir and Karataş (2016)	The financial performance of deposit banks operating on BIST between 2004 and 2014	VIKOR, Grey Relational Analysis and TOPSIS YMethods	
Yamaltdinova (2017)	The financial performance of commercial banks operating in the Kyrgyzstan financial sector between 2010 and 2014	TOPSIS Method	

Özbek (2017)	The financial performance of the primary school teachers' health and Social Assistance Fund (İLKSAN) between 2006 and 2015	COPRAS, TOPSIS and ELECTERE Methods
Cengiz et al. (2017)	The impact of independent audit quality on the financial performance of companies listed in the BIST manufacturing sector between 2010 and 2014	Multiple Regression Analysis
Gündoğdu (2018)	The financial performance of participation banks operating in turkey between 2010 and 2017	Grey Relational Analysis Method
Fahami et al. (2019)	The financial performance of companies operating in the service sector in Malaysia in 2017	TOPSIS Method
Işık (2019)	The overall performance of non-life insurance companies in the Turkish insurance sector between 2009 and 2017	CRITIC, TOPSIS ve Multi MOORA Methods
Suvvari et al. (2019)	The financial performance of life insurance companies in India between 2013 and 2016	Grey Relational Analysis Method
Apan and Öztel (2020)	The performance of Venture Capital Investment Trust Companies operating on BIST between 2012 and 2016	CRITIC and PROMETHEE Methods
Sudha (2020)	The impact of corporate environmental performance on the financial performance of 224 Indian S&P 500 companies between 2002 and 2011	Panel Data Analysis

The national and international literature review reveals that researchers have employed various analytical methods to determine the financial performance of companies operating in different sectors. In this study, conducted to assess the financial performance of REIT companies, the applicability of the CRITIC, ARAS, and COPRAS methods for calculating financial performance from the perspective of financial information users has been tested. This aspect of the study contributes to the literature. The sector under investigation, the period covered, the financial ratios utilized, and the analytical methods applied distinguish this research from previous studies in the literature.

3. METHODOLOGY

3.1. Purpose of the Research

In the study, it is aimed to determine the score points and rankings of the financial performances of 28 REIT companies whose stocks are traded in BIST over the years 2017-2021 by employing the CRITIC, ARAS, and COPRAS Methods, which are the MCDM methods.

3.2. Data and Variables Used in the Research

The financial ratio data of the REIT companies in the study were obtained from the Finnet Analysis Expert software. The evaluation criteria and codes used in the analysis are presented in Table 2.

Table 2. Financial Ratios and Codes

Row	Code	Evaluation Criteria	Objective
1	STD/TA	Short-Term Debts / Total Assets	Minimum
2	TD/TA	Debt to Asset Ratio	Minimum
3	CR	Current Ratio	Maximum
4	ROA	Return on Assets	Maximum
5	GOPM	Gross Operating Profit Margin	Maximum
6	ROE	Return on Equity	Maximum
7	RTR	Receivable Turnover Rate	Maximum
8	NSG	Net Sales Growth	Maximum

The titles and stock market codes of the REIT companies operating in the BIST are obtained from the Public Disclosure Platform and presented in Table 3. Due to data deficiencies in some financial ratios in the period under review, merely the companies with complete data are included in the analysis.

Table 3. Companies and Codes

Row	Code	Company Title	Row	Code	Company Title	Row	Code	Company Title
1	AGYO	ATAKULE	11	HLGYO	HALK	21	RYGYO	REYSAŞ
2	AKFGY	AKFEN	12	ISGYO	İŞ	22	SNGYO	SİNPAŞ
3	AKMGY	AKMERKEZ	13	KGYO	KORAY	23	SRVGY	SERVET
4	AKSGY	AKİŞ	14	KLGYO	KİLER	24	TDGYO	TREND
5	ALGYO	ALARKO	15	KRGYO	KÖRFEZ	25	TRGYO	TORUNLAR
6	ATAGY	ATA	16	NUGYO	NUROL	26	TSGYO	TSKB
7	AVGYO	AVRASYA	17	OZGYO	ÖZDERİCİ	27	VKGYO	VAKIF
8	DGGYO	DOĞUŞ	18	OZKGY	ÖZAK	28	YGGYO	YENİ GİMAT
9	DZGYO	DENİZ	19	PAGYO	PANORA			
10	EKGYO	EMLAK	20	PEGYO	PERA			

3.3. Significance of Research

This research is significant in terms of enabling the REIT companies to assess their financial goals and achieved status, as well as facilitating comparisons with other companies within the industry.

3.4. Limitation of Research

The constraints of the research involve 8 financial ratios, the CRITIC, ARAS, and COPRAS Methods to be employed in the analysis, and 28 REIT companies operating in Borsa Istanbul between 2017-2021 whose data would be accessed uninterruptedly.

3.5. Research Method

Decision-making typically involves setting a goal, identifying the alternatives necessary to achieve that goal, ranking the available options, and selecting the best alternative (Byrnes, 2002:209). Multi-Criteria Decision Making (MCDM) methods aim to determine the best alternative by considering multiple criteria during the selection process (Taherdoost & Madanchian, 2023:77). As is well known, company managers may need to make a variety of decisions to ensure the company's continuity, while investors must identify the best investment opportunities. In making these decisions, decision-makers require reliable and accurate data as well as a sound evaluation process. Thus, employing scientific methods and techniques in the decision-making process not only enhances the reliability of the results but also helps eliminate subjectivity from the decisions. For this reason, the study utilizes MCDM methods, which serve as an effective tool from both a scientific and technical perspective in decision-making processes. In the study, the CRITIC, ARAS, and COPRAS methods, which are among the MCDM methods, are employed upon analyzing the financial performances of 28 REIT companies traded in BIST over the years 2017-2021.

3.5.1. CRITIC Method

The CRITIC method was developed by Diakoulaki et al. (1995) to find the objective weights of the criteria in the MCDM process (Wu et al., 2020: 5-6). This method provides objective weighting by calculating both the

standard deviations and the correlation of the criteria (Demiroğlu and Coşkun, 2018: 187). The CRITIC method is employed in 5 steps. The variables and formulas used in this method are listed below (Ayçin, 2020: 76-78, Diakoulaki et al., 1995: 764-765):

A_i : i^{th} decision alternative ($i = 1, 2, \dots, m$)

C_j : j^{th} evaluation criteria ($j = 1, 2, \dots, n$)

x_{ij} : the value of the i^{th} alternative according to the j^{th} evaluation criteria

x_j^{max} : the maximum value assumed by the decision alternatives according to the j^{th} criteria

x_j^{min} : the minimum value assumed by the decision alternatives according to the j^{th} criteria

r_{ij} : the normalized value of the i^{th} alternative according to the j^{th} evaluation criteria.

ρ_{jk} : the coefficient of correlation between any j^{th} criterion and k^{th} criterion.

σ_j : the standard deviation value of the j^{th} criterion ($j = 1, 2, \dots, n$)

w_j : the weight of the j^{th} evaluation criteria ($j = 1, 2, \dots, n$)

Step 1: Establishing the Decision Matrix

$$x = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \dots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \tag{3.1}$$

Step 2: Normalization of the Decision Matrix

$$r_{ij} = \frac{x_{ij} - x_j^{\text{min}}}{x_j^{\text{max}} - x_j^{\text{min}}} \tag{3.2}$$

$$r_{ij} = \frac{x_j^{\text{max}} - x_{ij}}{x_j^{\text{max}} - x_j^{\text{min}}} \tag{3.3}$$

Step 3: Establishing the Matrix of Correlation Coefficients

$$\rho_{jk} = \frac{\sum_{i=1}^m (r_{ij} - \bar{r}_j)(r_{ik} - \bar{r}_k)}{\sqrt{\sum_{i=1}^m (r_{ij} - \bar{r}_j)^2 \sum_{i=1}^m (r_{ik} - \bar{r}_k)^2}} \tag{3.4}$$

Step 4: Calculating c_j Values

$$C_j = \sigma_j \sum_{k=1}^n (1 - \rho_{jk}) \tag{3.5}$$

$$\sigma_j = \sqrt{\frac{\sum_{i=1}^m (r_{ij} - \bar{r}_j)^2}{m}} \tag{3.6}$$

Step 5: Determining the Weight Values for the Criteria

$$w_j = \frac{c_j}{\sum_{i=1}^n c_j} \tag{3.7}$$

3.5.2. ARAS Method

The ARAS Method, as one of the MCDM Methods, was introduced by Zavadskas et al (2010). In the ARAS method, an optimal alternative is included in the decision problem by the researcher, and the utility function value of this alternative is compared with the utility function values of the alternatives under examination (Sliogeriene et al., 2013: 13). In other words, while determining the performances of the examined alternatives, each alternative has a proportional similarity to the optimal alternative (Özbek, 2017: 59). Therefore, the ARAS method is considered the most successful method in achieving the proportional ranking goal compared to other MCDM methods (Ecer, 2016: 91). The ARAS method is employed in 5 steps. The variables and formulas used in this method are listed below (Ayçin, 2020: 52-55, Zavadskas et al., 2010: 123-141):

m : number of decision alternatives

n : number of evaluation criteria

x_{ij} : performance value of the i^{th} decision alternative according to the j^{th} criterion.

$x_{0j} = \max x_{ij}$: utility-oriented criterion

i

$x_{0j} = \min x_{ij}$: cost-oriented criterion

i

w_j : weight of the j^{th} evaluation criterion ($j = 1, 2, \dots, n$)

\hat{x} : values for the weighted normalized decision matrix

S_i : optimality function of the i^{th} decision alternative

K_i : degree of the utility

Step 1: Establishing the Decision Matrix

$$x = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & & \vdots \\ x_{m1} & x_{m2} & & x_{mn} \end{bmatrix} \quad (3.8)$$

$$x_{0j} = \min x_{ij} \text{ : cost-oriented criterion} \quad (3.10)$$

i

Step 2: Normalizing the Decision Matrix

$$\bar{x}_{ij} = \frac{x_{ij}}{\sum_{i=0}^m x_{ij}} \quad (3.11)$$

$$\bar{x}_{ij} =$$

$$\frac{1/x_{ij}}{\sum_{i=0}^m 1/x_{ij}} \quad (3.12)$$

$$\bar{x} = \begin{bmatrix} \bar{x}_{01} & \bar{x}_{02} & \dots & \bar{x}_{0n} \\ \bar{x}_{11} & \bar{x}_{12} & \dots & \bar{x}_{1n} \\ \vdots & \vdots & & \vdots \\ \bar{x}_{m1} & \bar{x}_{m2} & & \bar{x}_{mn} \end{bmatrix} \quad (3.13)$$

Step 3: Weighting the Normalized Decision Matrix

$$\sum_{j=1}^n w_j = 1 \quad (3.14)$$

$$\hat{x}_{ij} = \bar{x}_{ij} w_j \quad (3.15)$$

$$\hat{x} = \begin{bmatrix} \hat{x}_{01} & \hat{x}_{02} & \dots & \hat{x}_{0n} \\ \hat{x}_{11} & \hat{x}_{12} & \dots & \hat{x}_{1n} \\ \vdots & \vdots & & \vdots \\ \hat{x}_{m1} & \hat{x}_{m2} & & \hat{x}_{mn} \end{bmatrix} \quad (3.16)$$

Step 4: Determination of the Optimality Function

$$S_i = \sum_{j=1}^n x_{ij} \tag{3.17}$$

Step 5: Determination of Utility Degree and Final Ranking

$$K_i = \frac{S_i}{S_0} \tag{3.18}$$

3.5.3. COPRAS Method

The COPRAS Method was employed for the first time in Zavadskas and Kaklauskas (1996) (Özbek and Erol, 2016: 30). The method evaluates the criteria values according to the position they have and is applied for evaluation in the process of maximizing the criterion value if it is positive and reducing it to the lowest level if it is negative (Podvezko, 2011: 137). Moreover, this method allows making comparisons by analyzing the superiority of alternatives to each other. The COPRAS method, which covers quantitative and qualitative criteria, allows the alternatives to be listed completely (Mulliner, 2013: 274). The COPRAS method is employed in 6 steps. The variables and formulas used in this method are presented below (Zavadskas et al., 2007: 1-10):

A_i : i^{th} decision alternative ($i = 1, 2, \dots, m$)

C_j : j^{th} evaluation criterion ($j = 1, 2, \dots, n$)

x_{ij} : the value of the i^{th} alternative according to the j^{th} criterion

w_j : the weight of the j^{th} evaluation criterion ($j = 1, 2, \dots, n$)

d_{ij} : the normalized value of the i^{th} alternative according to the j^{th} evaluation criterion ($j = 1, 2, \dots, n$)

D' : the weighted normalized decision matrix

S_{+i} : utility-oriented criteria

S_{-i} : cost-oriented criteria

Q_i : relative significance value for each decision alternative

Q_{max} : alternative with highest relative significance

P_i : performance index value for each decision alternative

Step 1: Establishment of the Decision Matrix

$$x = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & & \vdots \\ x_{m1} & x_{m2} & & x_{mn} \end{bmatrix} \tag{3.19}$$

Step 2: Normalization of the Decision Matrix

$$\bar{x}_{ij} = \frac{x_{ij}}{\sum_{i=0}^m x_{ij}} \tag{3.20}$$

Step 3: Weighting of the Normalized Decision Matrix

$$d_{ij} = \bar{x}_{ij} \cdot w_j \tag{3.21}$$

$$D' = \begin{bmatrix} d_{11} & d_{12} & \dots & d_{1n} \\ d_{21} & d_{22} & \dots & d_{2n} \\ \vdots & \vdots & & \vdots \\ d_{m1} & d_{m2} & & d_{mn} \end{bmatrix} \tag{3.22}$$

Step 4: Sum of the Criteria

$$S_{+i} = \sum_{j=1}^k d_{+ij}$$

$$S_{-i} = \sum_{j=k+1}^k d_{-ij} \tag{3.23}$$

Step 5: Relative Significance of Decision Alternatives

$$Q_i = S_{+i} \frac{S_{-min} \sum_{i=1}^m S_{-min}}{S_{-i} \sum_{i=1}^m \frac{1}{S_{-i}}} \tag{3.24}$$

Step 6: Performance Index of Decision Alternatives

$$P_i = \frac{Q_i}{Q_{imax}} \cdot \%100 \tag{3.25}$$

3.6. Correction of the Research Data

In the ARAS and COPRAS methods, negative data may cause problems since the normalization process is performed by dividing the criterion values by the column total (Ayçin, 2018: 603). Therefore, negative data in all analysis techniques for criterion values, the Z-score is converted into positive values by employing the standardization transformation method. The variables and formulas used in this method are presented below (Zhang et al., 2014):

x_{ij} : performance value of the i^{th} decision alternative according to the j^{th} criterion

\bar{x}_j : mean value of the j^{th} criterion

Z_{ij} : Z-score standardization

z_{ij}' : conversion of negative values into positive values

A : decision alternative

$$Z_{ij} = \frac{x_{ij} - \bar{x}_j}{\sigma_j} \tag{3.26}$$

$$z_{ij}' = z_{ij} + A ; \quad A > | \min z_{ij} | \tag{3.27}$$

4. FINDINGS

In this study, the data of REITs whose shares have been traded in BIST over the period 2017-2021 are analyzed with the help of financial ratios and employing the CRITIC, ARAS, and COPRAS Methods over the years. There are 28 REITs and 8 financial ratios in the analysis.

4.1. CRITIC Method Application

In order to determine the objective weights of the criteria, the data between the years 2017-2021 are analyzed by employing the CRITIC Method by years, and the weight values that are calculated for each criterion are presented in Table 4.

Table 4. Criteria Weights Calculated with the CRITIC Method (2017-2021)

Years - W_j	Criteria							
	STD/TA	TD/TA	CR	ROA	GOPM	ROE	RTR	NSG
2017 W_j	0.1147	0.1413	0.1166	0.0852	0.1723	0.1010	0.1389	0.1299
2018 W_j	0.1240	0.1207	0.1024	0.1049	0.1753	0.0827	0.1511	0.1390
2019 W_j	0.1217	0.1373	0.1171	0.0875	0.1289	0.0869	0.1587	0.1619
2020 W_j	0.1255	0.1288	0.1087	0.1049	0.1772	0.0986	0.1309	0.1253
2021 W_j	0.1310	0.1503	0.1188	0.0936	0.1562	0.0968	0.1194	0.1341

As seen in Table 4, the criteria with the highest weight in determining the criteria weights in the selection of REITs over the period 2017-2021 are GOPM (0.1723) in 2017, NSG (0.1619) in 2018, NSG (0.1619) in 2019, GOPM (0.1772) in 2020, and GOPM (0.1562) in 2021. As a result of the analysis, the criteria with the lowest weight are determined as ROA (0.0852) in 2017, ROE (0.0827) in 2018, ROE (0.0869) in 2019, ROE (0.0986) in 2020, and ROA (0.0936) in 2021.

4.2. ARAS Method Application

In order to determine the financial performance of the REIT companies, the five-year data obtained over the years 2017-2021 are used and analyzed by employing the ARAS Method over the years. The financial

performance scores and performance rankings of the REIT companies used in the analysis by years are presented in Table 5.

Table 5. Financial Performance Scores and Rankings Calculated with the ARAS Method (2017-2021)

Companies / Criteria	2017		2018		2019		2020		2021	
	K _i	Rank	K _i	Rank	K _i	Rank	K _i	Rank	K _i	Rank
AGYO	0.0954	8	0.0604	21	0.1272	11	0.0841	17	0.2462	6
AKFGY	0.0707	20	0.0688	20	0.2362	5	0.0491	27	0.1910	8
AKMGY	0.1408	6	0.1711	7	0.1516	8	0.1192	9	0.2485	5
AKSGY	0.1039	7	0.0878	10	0.0845	18	0.0719	21	0.0820	22
ALGYO	0.3754	2	0.3898	2	0.3869	3	0.3973	2	0.4137	3
ATAGY	0.2952	3	0.3172	3	0.3519	4	0.0971	14	0.0677	27
AVGYO	0.0928	9	0.1020	8	0.4822	1	0.6135	1	0.1212	13
DGGYO	0.0872	13	0.0769	15	0.0906	17	0.0685	22	0.0670	28
DZGYO	0.0842	14	0.0745	17	0.0822	20	0.2932	3	0.0746	23
EKGYO	0.0712	19	0.0587	22	0.0733	23	0.0631	24	0.0686	26
HLGYO	0.0789	16	0.0764	16	0.0786	21	0.0978	13	0.0709	25
ISGYO	0.0615	25	0.0545	23	0.0698	24	0.0672	23	0.0833	21
KGYO	0.0723	18	0.0801	14	0.1106	14	0.1274	7	0.1777	9
KLGYO	0.2460	4	0.0478	25	0.1121	12	0.0519	26	0.0905	20
KRGYO	0.0888	11	0.0977	9	0.1314	9	0.1055	12	0.1111	17
NUGYO	0.0455	27	0.0184	28	0.0463	28	0.0553	25	0.0711	24
OZGYO	0.0769	17	0.0467	26	0.0666	25	0.0847	16	0.1552	10
OZKGY	0.0878	12	0.0804	13	0.1286	10	0.1264	8	0.1184	14
PAGYO	0.4899	1	0.3983	1	0.3917	2	0.1405	6	0.4475	2
PEGYO	0.0394	28	0.0532	24	0.0477	27	0.0472	28	0.1126	16
RYGYO	0.0801	15	0.0819	11	0.0972	16	0.1119	11	0.1127	15
SNGYO	0.0489	26	0.0343	27	0.1111	13	0.0742	20	0.1296	12
SRVGY	0.0912	10	0.0815	12	0.0840	19	0.0914	15	0.1550	11
TDGYO	0.0656	24	0.2054	5	0.1677	7	0.2581	4	0.4855	1
TRGYO	0.0687	22	0.0689	19	0.0739	22	0.0839	18	0.1110	18
TSGYO	0.0672	23	0.0701	18	0.1032	15	0.0828	19	0.4083	4
VKGYO	0.0707	21	0.2483	4	0.0561	26	0.1177	10	0.1048	19
YGGYO	0.2071	5	0.1966	6	0.2207	6	0.2194	5	0.2137	7
Optimal Value	1.0000		1.0000		1.0000		1.0000		1.0000	

As seen in Table 5, the companies with the best final financial performance of the 28 companies for the years 2017-2021, which were carried out with the ARAS method to evaluate the REITs traded in BIST in terms of financial performance, are detected as PAGYO, PAGYO, AVGYO, AVGYO, and TDGYO, respectively. The companies with the worst financial performance are determined as PEGYO, NUGYO, NUGYO, PEGYO, and DGGYO, respectively.

4.3. COPRAS Method Application

In the COPRAS Method application, the five-year data are used to determine the financial performances of REIT companies over the years 2017-2021 and analyzed by employing the COPRAS Method by years. The financial performance scores and performance rankings of the REIT companies by year are presented in Table 6.

Table 6. Performance Scores and Rankings Calculated with the COPRAS Method (2017-2021)

Companies / Criteria	2017		2018		2019		2020		2021	
	P _i	Rank	P _i	Rank	P _i	Rank	P _i	Rank	P _i	Rank
AGYO	17,4704	8	12,8249	21	24,8630	11	11,8426	17	36,6398	5
AKFGY	11,1943	24	13,9268	19	47,3151	5	6,3207	28	24,7504	9
AKMGY	25,4667	6	39,5675	7	29,8634	8	16,2645	10	36,5313	6
AKSGY	17,5228	7	17,9768	10	15,6040	19	9,5463	21	11,2587	22
ALGYO	75,8536	2	96,8625	2	81,0865	4	62,3366	2	60,7675	4
ATAGY	59,3954	3	90,6803	3	89,7022	2	14,9760	11	9,3710	27
AVGYO	16,3080	10	21,8557	9	100,0000	1	100,0000	1	16,9440	13
DGGYO	14,2683	12	15,3655	16	16,5294	17	8,5398	23	9,0261	28
DZGYO	14,0659	14	15,2811	17	15,7254	18	47,6218	3	10,8231	23
EKGYO	11,7909	20	12,2830	22	13,8281	22	8,5192	24	9,5584	26
HLGYO	12,6590	18	16,9515	12	14,5857	21	13,3852	14	9,7995	25
ISGYO	10,3304	25	11,8688	24	13,2758	25	8,9525	22	11,5099	21
KGYO	13,1676	16	17,4506	11	21,2238	14	17,8456	8	25,6687	8
KLGYO	46,7466	4	9,7807	26	23,0226	12	6,9514	26	12,6221	20
KRGYO	16,5453	9	22,0818	8	26,0053	9	14,8238	13	15,8048	16
NUGYO	7,3712	27	3,9679	28	8,9089	27	7,5438	25	9,9945	24
OZGYO	13,6667	15	11,6182	25	13,3836	24	12,4686	15	22,2905	10
OZKGY	14,1876	13	16,5294	15	25,5635	10	17,9811	7	16,8084	15
PAGYO	100,0000	1	100,0000	1	82,0956	3	20,3309	6	68,8597	2
PEGYO	6,6267	28	12,1444	23	8,7398	28	6,4486	27	16,8538	14
RYGYO	12,8526	17	16,7248	13	17,9845	16	14,8566	12	15,4937	17
SNGYO	8,9466	26	7,1401	27	21,4764	13	9,9347	20	17,6884	12
SRVGY	14,7139	11	16,7074	14	15,3981	20	12,1131	16	21,7995	11
TDGYO	12,3308	19	54,2225	5	38,1153	7	41,8990	4	100,0000	1
TRGYO	11,2168	23	14,7476	18	13,5878	23	11,3185	19	15,3298	18
TSGYO	11,5473	21	12,9112	20	18,2987	15	11,7795	18	62,7481	3
VKGYO	11,4156	22	66,5668	4	9,9773	26	16,9586	9	14,6255	19
YGGYO	39,8128	5	46,8401	6	45,0899	6	33,7726	5	31,1650	7

According to the results of the analysis conducted over the years 2017-2021 employing the COPRAS method in the assessment of REIT companies in terms of financial performance, the companies with the best financial performance by years are determined as PAGYO, PAGYO, AVGYO, AVGYO, and TDGYO, respectively.

The companies with the worst financial performance are determined as PEGYO, NUGYO, PEGYO, AKFGY, and DGGYO, respectively.

5. CONCLUSION AND RECOMMENDATIONS

Along with the increase in the world population, the need for real estate and the rate of urbanization have also increased. After individuals begin to earn money and fulfill their physiological needs, they tend to convert their savings into investments. Although this investment was initially in securities, it evolves into real estate over time. Real estate is in demand by savers due to its low investment risk and good long-term returns. Real estate such as residences, offices, buildings, shopping malls, industrial warehouses, and hotels have become financial instruments used by both small and large investors to earn rental income and attract funds into the stock market.

Individual and institutional investors may buy shares of the REIT companies and earn dividends from the income stream and capital gains from real estate. Investors would wish to maximize their profit by buying the stock of the REIT company which has high financial performance. Furthermore, the REIT companies aim to enhance their profitability and efficiency to higher levels by calculating their financial performance. In light of these reasons, they calculate the financial performance of the REIT companies in order to determine their current status, determine their current level according to their past positions, and compare themselves with other companies. With financial performance analysis, the REIT companies can evaluate longer than one period and make sound financial decisions. The employment of MCDM Methods, which allow many criteria

to be considered concurrently in financial performance analysis, ensures that the analyses are supported with more accurate and more effective results.

In the study, it was aimed to analyze the financial performances of 28 Real Estate Investment Trust companies, whose stocks were traded in BIST and whose data could be accessed uninterruptedly, over the years 2017-2021 employing the CRITIC, ARAS, and COPRAS Methods from MCDM Techniques. The criteria weights of financial data were determined with the CRITIC Method employed in the research, and the success ranking of the financial performances of the Real Estate Investment Trust companies was made employing the ARAS and COPRAS Methods.

According to the analysis conducted using the CRITIC method and determined annually, the financial ratio with the highest weight was the Gross Operating Profit Margin for the years 2017, 2018, 2020, and 2021; whereas the Net Sales Growth was identified as the highest weighted ratio for the year 2019. The lowest weighted financial ratio was the Return on Equity in 2017, 2018, 2019, and 2020; whereas it was determined as Return on Assets in 2021.

According to the results of the analysis determined year by year employing the ARAS method, the companies with the best financial performance were determined as PAGYO in 2017 and 2018, AVGYO in 2019 and 2020, and TDGYO in 2021. The companies with the worst financial performance were found to be PEGYO in 2017 and 2020, NUGYO in 2018 and 2019, and DGGYO in 2021. According to the results of the annual analysis employing the COPRAS method, the companies with the best financial performance were determined to be PAGYO in 2017 and 2018, AVGYO in 2019 and 2020, and TDGYO in 2021. It was determined that the companies with the worst financial performance were PEGYO in 2017 and 2019, NUGYO in 2018, AKFGY in 2020, and DGGYO in 2021.

The analysis results are important not only for researchers but also for the entire financial information users, including investors. Therefore, it is necessary to consider the analysis results as a whole. In this study, it was determined that Gross Operating Profit Margin and Net Sales Growth rates were effective in determining the financial performance of REIT (Real Estate Investment Trust) companies. The Gross Operating Profit Margin is a ratio commonly used to measure the profitability of sales, since it considers only the cost of sales without taking into account operating expenses and other revenues and expenses. As well-known, Real Estate Investment Trusts generate profits from buying and selling real estate. In this context, it was observed that identifying the Gross Operating Profit Margin and Net Sales Growth rates, which have the greatest importance in determining financial performance according to CRITIC Analysis, aligns with the main objective of REITs, which is to generate profits from real estate transactions. Upon examining the results of ARAS and CORPAS Analyses, it was concluded that the ranking of financial performance achievements of REIT companies exhibited similarities. Upon comparing the results of ARAS and CORPAS Analyses, it was determined that REIT companies with high profitability and low debt ratios had higher rankings in financial performance. In financial literature, high profitability and low debt ratios are considered indicators of successful financial performance. The supportive nature of the results of ARAS and CORPAS Analyses for the conceptual framework supports the availability of MCDM methods to be employed by financial information users in determining the financial performance of companies. The research study may serve as a reference for future studies in this regard. The research results are limited to 28 companies, 8 financial ratios, and the methods employed in the analysis. In order to support the study results with more general findings, further analysis needs to be conducted using different financial ratios, statistics, and econometric methods with the same period and sample.

Financial ratio analysis remains a widely used technique for assessing the financial performance of companies, both in the past and present. However, as is well known, financial ratio analysis alone is not sufficient to accurately determine a company's financial performance. During the evaluation period, some financial ratios may meet desired benchmarks, while others may not. Such discrepancies can lead to misleading assessments of the company's overall financial performance. Therefore, in this study, Multi-Criteria Decision Making (MCDM) methods were employed to analyze financial ratios not individually but holistically, enabling more comprehensive evaluations by comparing companies with one another. This approach allows for a more scientifically and technically robust analysis. Previous studies by Feng and Wang (2000), Voulgaris et al. (2000), Atmaca (2012), Akyüz and Kaya (2013), Ergül (2014), Yamaltdinova (2017), Fahami et al. (2019), Suvvari et al.

(2019), and Apan and Öztel (2020) have demonstrated that MCDM methods can effectively measure the financial performance of companies. The findings of this study further support the use of MCDM methods by financial information users as a reliable tool for evaluating the financial performance of businesses.

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