Chapter 2

Evaluation of the Performance of BRICS-T Countries in the Context of the Economic Freedom Index

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Abstract

Since 1995, the Heritage Foundation has presented the factors that directly contribute to the economic freedom and prosperity of the international community in detail through the Economic Freedom Index (EFI). While the index evaluates the progress or decline of countries around the world, it focuses on key indicators of economic well-being such as economic growth, poverty reduction, longevity and health, as well as environmental protection. Through the index, the degree of economic freedom is relatively calculated as a significant factor in national development and prosperity on a global scale, and countries are ranked accordingly. Rankings of economic freedoms provide critical insights for countries, scholars, policymakers—in short, all stakeholders—to understand the impact of the measured criteria on economic growth. These rankings can guide the development of solutions to issues such as poverty and economic contraction faced by societies. Furthermore, through cross-country comparisons, differences in economic freedoms can be identified, and much can be learned about how to improve economic welfare and development. For these reasons, assessing the economic freedoms of countries holds vital importance. In this study, the economic freedom levels of the BRICS countries along with Turkey for the year 2025 are determined. Due to the presence of multiple indicators in the index and the involvement of multiple countries in terms of economic freedoms, the MEREC and WENSLO integrated AROMAN approach as Multi-Criteria Decision-Making (MCDM) techniques has been preferred. While the objective MCDM methods MEREC and WENSLO were used to determine the weights of the evaluation criteria, the AROMAN approach was employed to rank the BRICS-T countries.

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INTRODUCTION

Since 1995, the Heritage Foundation has detailed the factors contributing directly to the economic freedom and prosperity of the international community through the Economic Freedom Index (EFI). The Index focuses on fundamental economic well-being measures such as economic growth, poverty reduction, longevity, and health, along with various social indicators, while evaluating the progress or regression of countries worldwide. With the Index, the degrees of economic freedom are relatively calculated and countries are ranked as an important factor in the development and welfare of nations at the global level.

Economic freedom conceptually refers to the levels of freedom individuals, entrepreneurs, and businesses have to use their time and money in the way they believe is best for themselves, free from unnecessary government restrictions and plunder (Erdal, 2004). In other words, people are free to work, produce, consume, and invest in the way they believe is most productive (Beach and Miles, 2006). It is widely believed that economic freedom brings prosperity to countries. Additionally, a country's economic freedom is closely related to financial stability and the development of capital markets (Luo, 2014).

Economic growth is primarily a result of the benefits generated by capital investments, profits from trade, the discovery of advanced products, lower-cost production methods, and achieving better outcomes. In the literature, there are many studies indicating that countries with greater economic freedom grow faster and achieve higher per capita income than those with less freedom. Considering the source of growth and prosperity, it is evident that the advancements in quality of life move in parallel with the increase in economic freedom. Personal choices, voluntary exchange regulated by markets, free entry to markets, competition, and the protection of assets from occupation by others can be listed as the fundamental components of economic freedom (Lawson, 2009).

Based on information obtained from The Heritage Foundation, EFI has been designed to evaluate the consistency of economic policies in countries with a free market economy. The positive relationship between economic freedom and socioeconomic goals is defined by EFI. Because there is a strong correlation between the principles of economic freedom and a cleaner environment, healthier societies, greater per capita wealth, more development, and the eradication of poverty. EFI consists of twelve indicators across four main categories. These categories can be summarized as Government Size (government spending, fiscal health, and tax burden), Regulatory Efficiency (monetary freedom, freedom of labor, and freedom of business), Open Markets (freedom of investment, freedom of trade, and financial freedom), and Rule of Law (judicial effectiveness, property rights, and government integrity). Each indicator within these categories has values ranging from 0 to 100 (Kılcı, 2019).

EFI, which is frequently used by scientists, economists, and investors, is seen as the key to attracting investment and creating sound public policies. In recent years, the index has gained critical importance for countries seeking to enhance their international appeal and branding, as well as for global investors. As a measure of economic freedom and competitiveness, the EFI can help countries market themselves (Olson, 2014).

Economic freedom rankings provide critical information to countries, scientists, policymakers, and all stakeholders to understand the impact of the evaluated criteria on economic growth. These rankings can guide the development of solutions to issues such as poverty and economic contraction that societies face. Additionally, by making comparisons between countries, differences in economic freedoms can be identified, and much can be learned about improving economic prosperity and development. For these reasons, evaluating the economic freedoms of countries is of critical importance. Especially for developing countries to have a greater say in economic matters and to achieve economic expansion, they need to perform well on the indicators included in the EFI. At this point, the BRICS countries, along with Turkey, which together constitute about a quarter of the world economy, are striving to increase their growth rates, achieve development, and attract investors in the context of global power. In line with these goals, evaluating the current economic freedoms of these countries is of great importance. Therefore, in this study, the economic freedom levels of Turkey for the year 2025, along with the BRICS countries, have been determined. Due to the index having multiple indicators and multiple countries in terms of economic freedoms, the study preferred the AROMAN method integrated with MEREC and WENSLO from the Multi-Criteria Decision Making (MCDM) methods. In the weighting of the evaluation criteria, the objective MCDM methods MEREC and WENSLO were used, and the AROMAN approach was considered for the ranking of BRICS-T countries.

LITERATURE REVIEW

In the literature, there are many studies that demonstrate a positive relationship between economic freedom and economic growth. (Razmi and Refaei, 2013; Akin et al., 2014; Le Roux, 2015; Nadeem et al., 2019;

Thuy, 2021). At the same time, there are many studies that provide evidence that economic freedom leads to better living standards, improves social welfare, causes income growth, and enhances incentives, productive efforts, and resource utilization efficiency (Hall and Lawson, 2014; Gehring, 2013; Erdal, 2004; Easton and Walker, 1997). Along with these studies, there are also works examining the extent to which economic freedom policies affect carbon emissions (Abeka et al., 2022), the relationship between renewable energy consumption and economic freedom (Dumitrescu and Hurlin, 2012), the relationship between foreign direct investments and economic freedom (Ciftci and Durusu-Ciftci, 2022), and the relationship between energy intensity, carbon emissions, and economic freedom (Mahmood, Shahab and Shahbaz, 2022).

The presence of multiple indicators in EFI has increased interest in using MCDM methods to determine the economic levels of countries. Balkan countries (Puška, Štilić and Stojanović, 2023), OPEC countries (Ecer and Zolfani, 2022), European Union countries (Karaköy et al., 2023), countries located in the European continent (Altın, 2020), and all countries examined by the Heritage Foundation (Atan, Atan and Gökmen, 2024) have utilized MCDM methods in determining their economic levels. In this context, the lack of evaluation of the economic freedom levels of the BRICS countries, which aim to have a greater say in international matters alongside Turkey and to create an alternative to the Western world's dominance over the global financial system, can be identified as a gap in the literature. The pressure exerted on the global economy by trade wars, the impact of economic decisions made during the Covid-19 pandemic, the conflicts between Russia and Ukraine, and in the Middle East, as well as geopolitical tensions, have influenced the preference for BRICS countries. Additionally, due to reasons such as the support of free markets by economic freedom and the provision of innovative and practical solutions necessary for sustainable development, MCDM methods have been utilized in determining the levels of economic freedom of BRICS countries.

MATERIAL AND METHODS

Material

EFI is considered the most important method used to measure the economic freedom levels of countries, and therefore, there are many studies related to the index. However, the number of studies that evaluate the levels of economic freedom of countries through monitoring and control, and analyze the degree of achievement of goals, is virtually nonexistent. In this context, the indicators included in the EFI, conceptualized by the Heritage Foundation, have been integrated into the methodology and method. With the help of data on the indicators included in the index, the focus has been on calculating the importance levels of the criteria that play a role in ensuring economic freedom, and determining the economic freedom rankings of Turkey along with the BRICS countries. For this purpose, MCDM methods have been utilized.

Methods

The Collection of the Data

The Heritage Foundation publishes a dataset of 12 macroeconomic indicators for 184 countries each year, laying the foundation for economic growth, achieving prosperity, and improving quality of life. EFI is seen as an objective tool for analyzing the economic freedom levels of countries. Additionally, the data included in the index is an important resource for a comprehensive analysis of the economic and political situations of the countries. In this context, the study utilized secondary data published by the Heritage Foundation for the year 2025 (https://www.heritage.org/index/pages/all-country-scores).

MEREC

Keshavarz-Ghorabaee et al. (2021) proposed MEREC (MEthod based on the Removal Effects of Criteria) that considers a novel principle for obtaining objective weights related to criteria. Apart from other weighting methods, MEREC handles removal effects of each criterion on the aggregate performance of alternatives in order to compute the weights. In this method when a criterion having greater weight is removed leads to more effects on aggregate performances of alternatives. Causality concept is the basis of this method. The aim of this method is to determine the criterion having the greatest impact on the overall performance of alternatives and assign the most weight to this criterion. A logarithmic function with equal weights is handled to assess the aggregate performance of alternatives in this study. Besides the absolute deviaition measure is considered for determining the effects of removing each criterion. Steps of the MEREC method can be stated as below (Keshavarz-Ghorabaee et al., 2021):

Step 1. A decision matrix indicating each alternative's ratings or values related to each criterion is created. Consider that there are m alternatives and n criteria, the initial decision matrix D is constructed as below:

$$D = \begin{bmatrix} d_{11} & \cdots & d_{1n} \\ \vdots & \ddots & \vdots \\ d_{m1} & \cdots & d_{mn} \end{bmatrix} \quad , \quad \begin{matrix} i = 1,\ldots,m \\ j = 1,\ldots,n \end{matrix} \tag{1}$$

The elements of this matrix $\left(d_{ij}\right)$ need to be greater than zero $\left(d_{ij} > 0\right)$. If negative or zero values exist in the decision matrix such as in our study, appropriate transformation technique needs to be applied for obtaining positive ones.

Step 2. The elements of the decision matrix is normalized via simple linear normalization as specified in Equation (2):

$$f_{ij} = \begin{cases} \dfrac{\underset{i}{min}\, e_{ij}}{e_{ij}} & , \quad j \in B \\ \dfrac{\underset{i}{max}\, e_{ij}}{e_{ij}} & , \quad j \in C \end{cases} \tag{2}$$

where B denotes the set of benefit-based criteria, C shows the set of cost-based criteria. Additionally, the elements of the normalized decision matrix are represented by f_{ij}.

Step 3. The overall performance of alternatives is acquired via a logarithmic measure with equal criteria weights as seen in Equation (3). A non-linear function is considered to form this measure. By taking the normalized values into the account, it can be implied that the lower values of f_{ij} lead greater performance values of alternatives $\left(S_i\right)$.

$$S_i = \ln\left(1 + \left(\frac{1}{n}\sum_j \left|\ln\left(f_{ij}\right)\right|\right)\right) \tag{3}$$

Step 4. The performance of alternatives in terms of removing different criterion at each step is computed via logarithmic measure as seen in Equation (4).

$$S_{ij}^{'} = \ln\left(1 + \left(\frac{1}{n}\sum_{k,k \neq j} \left|\ln\left(f_{ij}\right)\right|\right)\right) \tag{4}$$

According to Equation (4), S'_{ij} shows the overall performance of ith alternative related to the removal of *j*th criterion.

Step 5. The removal effect of jth criterion is calculated according to Equation (5) shown as below:

$$E_j = \sum_i \left| S'_{ij} - S_i \right| \tag{5}$$

where E_j represents the effect of removing *j*th criterion.

Step 6. Objective weight for each criterion $\left(w_j\right)$ is computed via Equation (6) by utilizing the E_j values obtained in the fifth step.

$$w_j = \frac{E_j}{\sum_k E_k} \tag{6}$$

WENSLO

Pamucar et al. (2024) developed a novel objective weighting method namely WENSLO (Weights by Envelope and Slope) based on the ratio between the envelope and slope of each criterion. If the value of envelope is high and the value of slope is low, related criterion has a greater weight. The main advantage is based on the fact that the weights of criteria are independent of judgments of decision makers. Besides the criteria tendency (being benefit or cost based) has not any impact on the computation of WENSLO. In other words, the normalization procedure for input data does not based on criteria preferences. It shows that the proposed method is very reliable and stable. Also, this method can be considered for determining criteria weights and applicable for any MCDM problem where decision maker wants to avoid subjectivity. WENSLO can capture the behaviour of criterion without considering the randomness of it and can be achieved by accumulating the normalized criterion data. Steps of WENSLO can be stated as below (Pamucar et al. 2024):

Step 1. Creating a decision-making matrix: In the first step, initial decision matrix $\Re\left(A,C\right)_{mxn}$ is created as below:

$$\Re\left(A,C\right)=\left[\zeta_{ij}\right]_{mxn}=\begin{bmatrix} A/C & C_1 & C_2 & \cdots & C_j \\ target & maxmin & maxmin & \cdots & maxmin \\ A_1 & \zeta_{11} & \zeta_{12} & \cdots & \zeta_{1j} \\ A_2 & \zeta_{21} & \zeta_{22} & \cdots & \zeta_{2j} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ A_i & \zeta_{i1} & \zeta_{i2} & \cdots & \zeta_{mn} \end{bmatrix} \tag{7}$$

Where $A_1, A_2, \ldots, A_m$ represents a collection of alternatives, *m* shows the number of alternatives, $C_1, C_2, \ldots, C_n$ represents a collection of criteria, *n* shows the number of criteria, *maxmin* target relates to direction of each criterion. If the criterion aims to achieve max value, benefit-based environment is valid. On the contrary if the criteria aim to achieve min value, cost-based environment can be applicable too, ζ_{ij} shows the estimated value of *i*th alternative in terms of *j*th criterion.

Step 2. Normalizing the input data: Each criterion is characterized by attribute namely dimension that leads the multidimensional vector space of decision matrix. In such a situation, any kind of calculation creates a big problem. So, a nondimensional decision matrix is formed in terms of normalization process for overcoming this difficulty. The normalization process is applied to the elements of $\Re\left(A,C\right)$ matrix. Within this regard, Equation (8) given below is considered for linear normalization:

$$z_{ij}=\frac{\zeta_{ij}}{\sum_{i=1}^{m}\zeta_{ij}} \qquad \forall j\in\left[1,2,\ldots,n\right] \tag{8}$$

A normalized decision matrix as the outcome is formed as follows:

$$Z(A,C)=\left[z_{ij}\right]_{mxn}=\begin{bmatrix} A/C & C_1 & C_2 & \cdots & C_j \\ target & maxmin & maxmin & \cdots & maxmin \\ A_1 & z_{11} & z_{12} & \cdots & z_{1j} \\ A_2 & z_{21} & z_{22} & \cdots & z_{2j} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ A_i & z_{i1} & z_{i2} & \cdots & z_{mn} \end{bmatrix} \quad (9)$$

where z_{ij} shows the component of the normalized decision matrix Z and $0 < z_{ij} < 1$.

Step 3. Computing the criterion class interval: The final ranking of alternatives in terms of the given set of criteria is related to the impact of each criterion on the ranking. This impact is called as the criteria weights in decision theory. Defining these weights without subjectivity is considered as important task. The vector space of the normalized decision matrix is shown as below:

$$\begin{bmatrix} A \\ A_1 \\ A_2 \\ \vdots \\ A_i \end{bmatrix} = \left(\begin{bmatrix} C_1 \\ z_{11} \\ z_{21} \\ \vdots \\ z_{i1} \end{bmatrix}, \begin{bmatrix} C_2 \\ z_{12} \\ z_{22} \\ \vdots \\ z_{i2} \end{bmatrix}, \cdots, \begin{bmatrix} C_j \\ z_{1j} \\ z_{2j} \\ \vdots \\ z_{ij} \end{bmatrix} \right) \quad (10)$$

In terms of Sturges' rule, the dimension of the *j*th criterion class interval Δz_j is computed according to Equation (11):

$$\Delta z_j = \frac{\max\limits_{i=1,2,\ldots,m} z_{ij} - \min\limits_{i=1,2,\ldots,m} z_{ij}}{1+3.322*\log(m)} \qquad \forall j \in [1,2,\ldots,n] \quad (11)$$

According to the Equation (11), the class intervals of the C_1 and C_2 are computed as follows:

$$\Delta z_1 = \frac{\max\limits_{i=1,2,\ldots,m} z_{i1} - \min\limits_{i=1,2,\ldots,m} z_{i1}}{1+3.322*\log(m)}; \quad \Delta z_2 = \frac{\max\limits_{i=1,2,\ldots,m} z_{i2} - \min\limits_{i=1,2,\ldots,m} z_{i2}}{1+3.322*\log(m)} \quad (12)$$

Step 4. Computing the criterion slope: The slope of the criterion is computed according to the Equation (13):

$$tan\varphi_j = \frac{\sum_{i=1}^{m} z_{ij}}{(m-1)\cdot\Delta z_j} \qquad \forall j \in [1,2,\ldots,n] \qquad (13)$$

Step 5. Defining the criterion envelope: The sum of the partial Euclidean distance between two successive normalized values of the jth criterion that equals to the total Euclidean distance between the first and last normalized values, and defined according to Equation (14):

$$E_j = \sum_{i=1}^{m-1} \sqrt{\left(z_i + \ddot{A} j - z_i, j\right)^2 + z_j^2} \quad 1,2, \quad , \forall j \in [\quad \ldots n] \qquad (14)$$

The envelope of criterion can be considered to represent the total Euclidean distance. The shape of the envelope likes a zig-zag line indicating its values.

Step 6. Determining the envelope-slope ratio: The ratio of the total Euclidean distance to the slope of the criterion as a numerical value is computed as follows:

$$q_j = \frac{E_j}{tan\varphi_j} \qquad \forall j \in [1,2,\ldots,n] \qquad (15)$$

Step 7. Computing the criteria weights: The weight of the criterion is computed according to Equation (16).

$$w_j = \frac{q_j}{\sum_{j=1}^{n} q_j} \qquad \forall j \in [1,2,\ldots,n] \qquad (16)$$

Following to that artificial accumulation and the error of the artificial accumulation (difference between the real and artificial accumulated value) are obtained via Equaions (17) and (18).

$$\overset{\boxtimes}{z}_j\left(i,\Delta z_j\right) = tan\varphi_j \left(i.\Delta z_j\right) i = 0,1,2,\ldots,m-1 \forall j \in [1,n] \qquad (17)$$

$$\varepsilon_i\left(\Delta z_j\right)=z_{ij}-\overset{\boxtimes}{z}_{ij}\quad i=1,2,\ldots,m-1\,\forall j\in\left[1,n\right] \tag{18}$$

Then, to verify the validity of an artificial process related to accumulation, two widely used methods namely mean-squared error (MSE) and coefficient of correlation (r) are taken into the account. The results can be considered as valid if MSE and r close to 0 and 1 respectively.

Integrated Weights

Integrated objective weight for each criterion by considering the weights of MEREC $\left(w_{j,merec}\right)$ and WENSLO $\left(w_{j,wenslo}\right)$ can be calculated as follows (Zavadkas and Podvezko, 2016):

$$w_{j,integrated}=\frac{w_{j,merec}w_{j,wenslo}}{\sum_{j=1}^{m}w_{j,merec}w_{j,wenslo}} \tag{19}$$

AROMAN

Boskovic et al. (2023) proposed the AROMAN (Alternative Ranking Order Method Accounting for Two-Step Normalization), which couples the linear and vector normalization techniques for acquiring precise data structures used in further calculation. The AROMAN method combines the normalized data from two-step normalization and acquires an average matrix from normalized data. Steps of AROMAN method can be summarized as below (Bošković et al.x 2023; Nikolić et al., 2023):

Step 1. Constructing the initial decision-making matrix by considering the input data: The initial decision matrix D_{mxn} is created via the input data $d_{11},\ldots,d_{mn}$ seen as Equation (20).

$$D=\begin{bmatrix} d_{11} & \cdots & d_{1n} \\ \vdots & \ddots & \vdots \\ d_{m1} & \cdots & d_{mn} \end{bmatrix},\quad \begin{matrix} i=1,\ldots,m \\ j=1,\ldots,n \end{matrix}; \tag{20}$$

Step 2. Normalizing the input data: The input data is formed in intervals between 0 and 1 via normalization process. Two types of normalization are taken into the account and can be seen as Equations (21) and (22).

Step 2.1. Normalization 1 (Linear):

$$t_{ij}=\frac{d_{ij}-\min\limits_i d_{ij}}{\max\limits_i d_{ij}-\min\limits_i d_{ij}},i=1,\ldots,m;\,j=1,\ldots,n; \tag{21}$$

Step 2.2. Normalization 2 (Vector):

$$t_{ij}^{*} = \frac{d_{ij}}{\sqrt{\sum_{i=1}^{m} d_{ij}^{2}}}; i = 1, \ldots, m; j = 1, \ldots, n; \tag{22}$$

Aforementioned two types of normalization techniques are considered for both criterion types (min and max).

Step 2.3. Obtaining aggregated averaged normalization: The aggregated averaged normalization is found by Equations (23):

$$t_{ij}^{norm} = \frac{\beta t_{ij} + (1-\beta) t_{ij}^{*}}{2}; i = 1, \ldots, m; j = 1, \ldots, n; \tag{23}$$

where t_{ij}^{norm} shows the aggregated averaged normalization and β is a weighting factor that is considered for each type of normalization varying from 0 to 1. In this study β is considered as 0.5.

Step 3. Acquiring the weighted aggregated normalized decision-making matrix: The aggregated averaged normalized decision-making matrix is multiplied by the criteria weights for obtaining a weighted decision-making matrix seen as Equation (24):

$$\overset{\square}{t}_{ij} = W_{ij} . t_{ij}^{norm}; i = 1, \ldots, m; j = 1, \ldots, n; \tag{24}$$

Step 4. Separately summarizing the normalized weighted values for the criteria type min (L_i) and the type max (A_i): This procedure is computed via Equations (25) and (26).

$$L_i = \sum_{j=1}^{n} \overset{\square}{t}_{ij}^{(min)}; i = 1, \ldots, m; j = 1, \ldots, n; \tag{25}$$

$$A_i = \sum_{j=1}^{n} \overset{\square}{t}_{ij}^{(max)}; i = 1, \ldots, m; j = 1, \ldots, n; \tag{26}$$

Step 5. Raising the obtained sum of L_i and A_i values to the degree of: This procedure is calculated by applying Equations (27) and (28).

$$L_i^{\wedge} = L_i^{\lambda} = \left(\sum_{j=1}^{n} t_{ij}^{\square(min)} \right)^{\lambda}, i = 1, \ldots, m \tag{27}$$

$$A_i^{\wedge} = A_i^{1-\lambda} = \left(\sum_{j=1}^{n} t_{ij}^{\square(max)} \right)^{1-\lambda}, i = 1, \ldots, m \tag{28}$$

where λ shows the coefficient degree of the criterion type. In this study the parameter λ is considered as 0.5 due to including both criterion types. In order to avoid undefined results caused by considering solely of benefit or cost criteria, the parameter λ can be accepted as 0.5.

Step 6. Computing the difference between the values $A_i^{\wedge}$ and $L_i^{\wedge}$ and obtaining the final ranking: This procedure is calculated via Equation (29).

$$R_i = e^{\left(A_i^{\wedge} - L_i^{\wedge}\right)}, i = 1, \ldots, m \tag{29}$$

where R_i shows the final ranking of alternatives.

RESULTS

The Heritage Foundation evaluates all the criteria used to assess countries' economic freedom performance with equal importance. EFI is an index that measures how far people can go in economic actions in terms of free markets, free trade, and private property within the scope of their fundamental rights and freedoms, and compares countries accordingly. Therefore, the index plays an important role in improving sustainable development and human development and in achieving economic goals. For these reasons, addressing the performance of countries based on economic metrics is a complex task (Gwartney, 2008; Ott, 2018). Therefore, under this title, the application of the proposed methodologies of the MEREC, WENSLO, and AROMAN methods to rank Turkey along with the BRICS countries in terms of economic freedoms has been described.

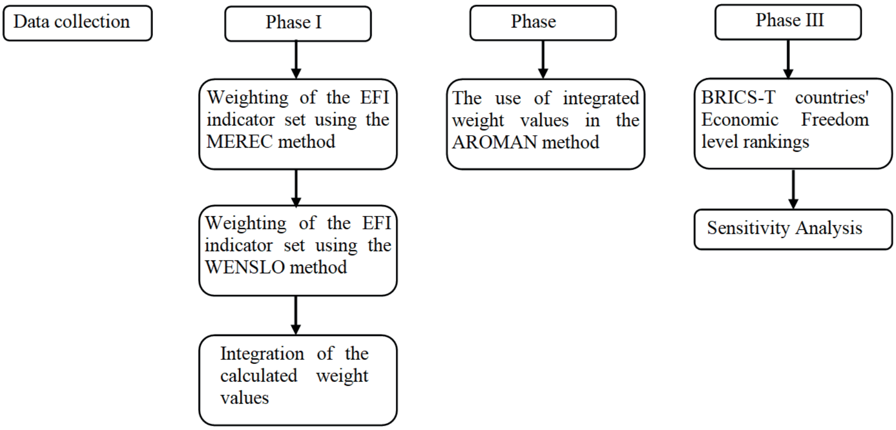

Figure 1. The framework for ranking BRICS-T countries by EFI indicators

In this context, the indicator weights were first determined using the MEREC and WENSLO methods to achieve the set goals. Later, AROMAN was integrated into these methods, and the 10 BRICS countries (Brazil (BRE), China (CHN), Egypt (EGY), Ethiopia (ETH), India (IND), Indonesia (INS), Iran (IR), Russia (RUS), South Africa (SA), United Arab Emirates (UAE), along with Turkey (TR), were ranked according to their economic freedom levels. A summary of the proposed MEREC-WENSLO-AROMAN model for evaluating the economic freedom levels of the specified countries can be expressed in Figure 1.

Determining the Weights of EFI Criteria with MEREC and WENSLO

As previously mentioned, the EFI published by the Heritage Foundation includes 12 economic indicators. The derivation of the importance levels of these indicators with MEREC and WENSLO constitutes the first step of the developed methodology. The definitions of the relevant indicators are provided in Table 1.

Table 1. Economic Freedom Index indicator set

C1	Property Rights	**C7**	Business Freedom
C2	Judicial Effectiveness	**C8**	Labor Freedom
C3	Government Integrity	**C9**	Monetary Freedom
C4	Tax Burden	**C10**	Trade Freedom
C5	Government Spending	**C11**	Investment Freedom
C6	Fiscal Health	**C12**	Financial Freedom

After this stage, the dataset consisting of 12 indicators and 11 alternatives (BRICS-T countries), in other words, the decision matrix, is shown in Table 2.

Table 2. Economic freedom indicators of BRICS-T countries by 2025

	Criteria											
Optimization	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*	*Max*
Countries	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
BRE	51	54	36	75	44	50	67	57	74	72	40	40
CHN	47	37	40	72	67	11	68	58	75	74	20	20
EGY	41	22	30	86	82	21	48	44	63	60	65	50
ETH	28	20	33	78	95	81	45	39	50	57	30	20
IND	51	53	38	71	74	6	72	59	70	61	40	40
INS	40	45	40	82	91	85	73	59	78	79	50	60
IR	23	19	16	81	94	84	38	44	39	56	5	10
RUS	19	28	23	88	62	98	51	59	62	69	30	30
SA	44	58	45	68	69	46	64	71	75	68	40	40
UAE	65	35	66	97	82	98	84	62	81	78	50	60
TR	41	24	34	72	72	82	59	48	38	73	70	60

The importance levels of the economic freedom criteria obtained by integrating the MEREC and WENSLO methods are presented in Table 3.

Table 3. Economic Freedom Index criteria integrated importance degree values

Criteria	MEREC	WENSLO	Mean Squared Error	Coefficient of Correlation	Integrated Weight	Rank
C1	0.0770	0.0840	0.0044	0.9887	**0.0485**	6
C2	0.0603	0.1089	0.0039	0.9927	**0.0493**	5
C3	0.0782	0.1102	0.0026	0.9920	**0.0647**	4
C4	0.0157	0.0097	0.0015	0.9976	**0.0011**	12
C5	0.0570	0.0290	0.0011	0.9982	**0.0124**	9
C6	0.2249	0.1958	0.0055	0.9900	**0.3304**	1
C7	0.0449	0.0397	0.0022	0.9952	**0.0134**	8
C8	0.0324	0.0262	0.0014	0.9969	**0.0064**	10
C9	0.0515	0.0418	0.0039	0.9936	**0.0161**	7
C10	0.0195	0.0095	0.0018	0.9966	**0.0014**	11
C11	0.2078	0.2037	0.0024	0.9906	**0.3176**	2
C12	0.1308	0.1414	0.0019	0.9935	**0.1387**	3
			Average of MSE: 0.0027	**Average of CC:** 0.9938		

According to the Table 3 while the average of MSE is found as 0.0027, the average of CC is obtained as 0.9938. These obtained values show that the results can be considered as valid and hypotenuse can be regarded for computing the slope related to the criterion (Pamucar et al., 2024). The most important indicator among the economic freedom criteria, determined by integrating the MEREC and WENSLO techniques, is Fiscal Health (C6) (0.3304). This criterion is followed by Investment Freedom (C11) (0.3176) and Financial Freedom (C12) (0.1387). However, the Tax Burden (C4) (0.0011) has been objectively determined to be the least important indicator among the 12 indicators.

Ranking of BRICS-T Countries According to Their Economic Freedom Levels

It is important to follow a data-driven methodological approach to determine the current status of countries and compare their performance according to economic freedom criteria, without the influence of decision-makers or economic authorities. Additionally, since the ranking of countries' levels of economic freedom inherently involves multiple criteria and alternatives, it is suitable for examination within the framework of decision theory using MCDM. Among the MCDM methods, the AROMAN method has been preferred due to reasons such as offering an innovative approach, including a two-step normalization process to provide fair and impartial comparisons among alternatives, and facilitating a comprehensive ranking by considering the relative importance levels of the criteria (Bošković, et al., 2023).

Table 4. Ranking of BRICS-T countries according to their level of economic freedom

	Final Ranking (Lambda=0.5)	Rank
BRE	1.5695	6
CHN	1.3621	11
EGY	1.5623	7
ETH	1.5286	8
IND	1.4738	9
INS	1.7022	3
IR	1.4127	10
RUS	1.5774	4
SA	1.5701	5
UAE	1.7554	1
TR	1.7225	2

According to the AROMAN method from Table 4, the countries with the highest levels of economic freedom among the BRICS-T countries are the United Arab Emirates (UAE), Turkey (TR), and Indonesia (INS), in that order. The country ranked last in the economic freedom ranking is China (CHN).

Sensitivity Analysis

In order to check the stability and validity of the proposed model a sensitivity analysis is conducted by changing λ and β values. According to the original case the parameters of λ and β are considered as 0.5. In terms of sensitivity analysis, the proposed model is examined for other scenarios via an increment value of 0.1. While the sensitivity results related to the changing λ values are presented in Figure 2, the obtained results in terms of changing β values are shown in Figure 3.

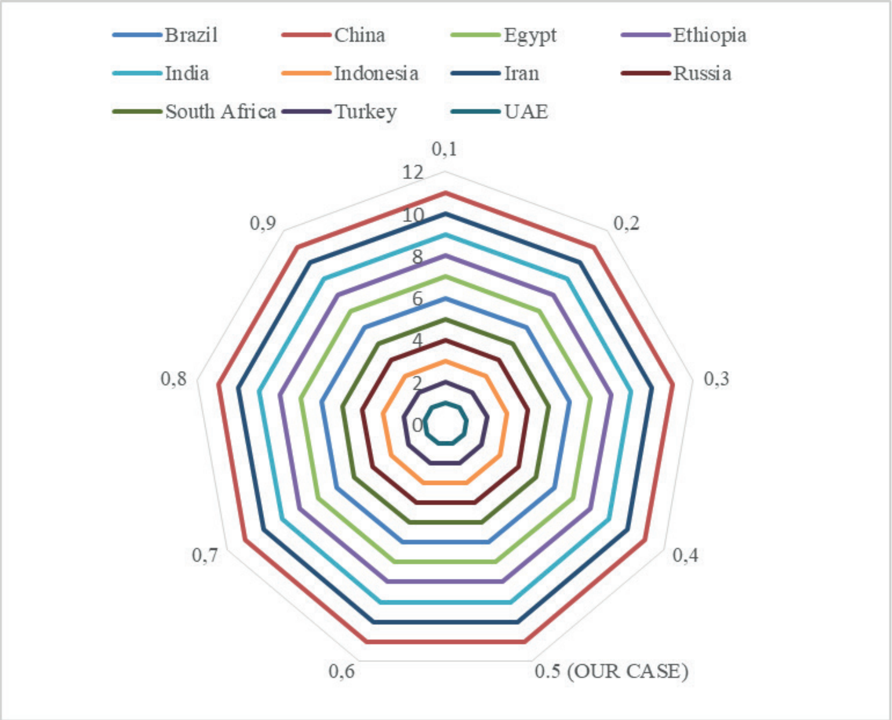

Figure 2. Ranking changes for alternatives by changing λ values

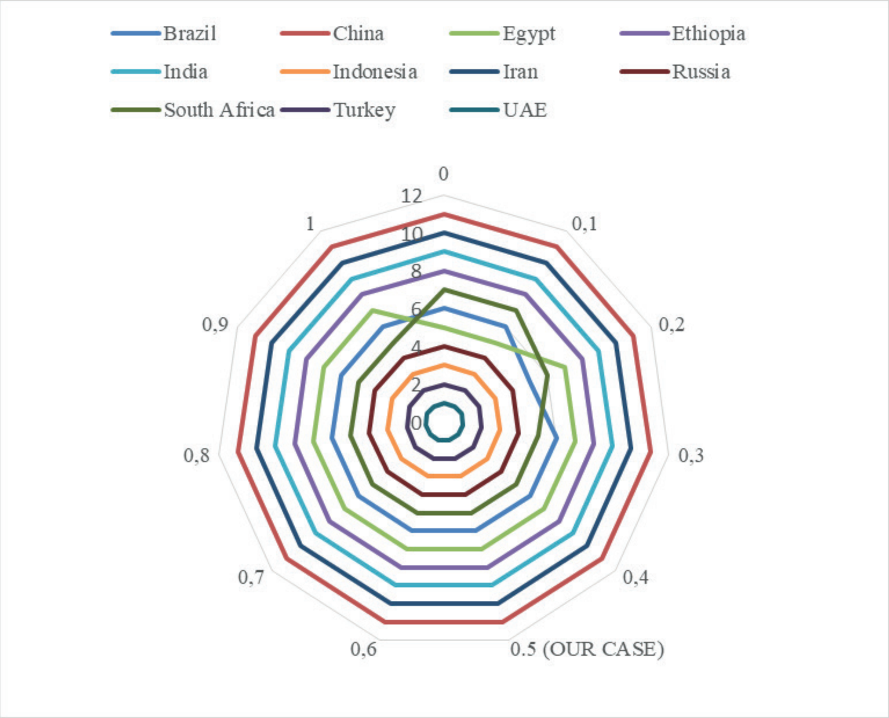

Figure 3. Ranking changes for alternatives by changing β values

According to the Figure 2 same ranking results related to the alternatives are obtained for all scenarios. Slight variations related to the alternatives (BRE, EGY and SA) are seen in first three scenarios in terms of Figure 3. When the sensitivity results in terms of changing λ and β values are considered, it is understood that the proposed model is stable and valid.

Comparison Analysis

In order to test the validity related to the decision models the ranking results of the AROMAN and other MCDM methods consisting of CoCoSo, MARCOS, ARAS, WASPAS, WEDBA, CRADIS and MAIRCA are compared and the analysis is made in terms of Spearman's rank correlation coefficient values. While the obtained Spearman's rank correlation coefficient values are depicted in Table 5, the ranking results related to the comparison analysis are shown in Figure 4.

Table 5. Spearman's rank correlation coefficient values related to the methods compared

	AROMAN	CoCoSo	MARCOS	ARAS	WASPAS	WEDBA	CRADIS	MAIRCA
AROMAN	1,0000							
CoCoSo	0,9273	1,0000						
MARCOS	0,9909	0,9182	1,0000					
ARAS	0,9636	0,9636	0,9727	1,0000				
WASPAS	0,9909	0,9182	1,0000	0,9727	1,0000			
WEDBA	0,9273	0,9545	0,9364	0,9818	0,9364	1,0000		
CRADIS	0,9909	0,9182	1,0000	0,9727	1,0000	0,9364	1,0000	
MAIRCA	1,0000	0,9273	0,9909	0,9636	0,9909	0,9273	0,9909	1,0000

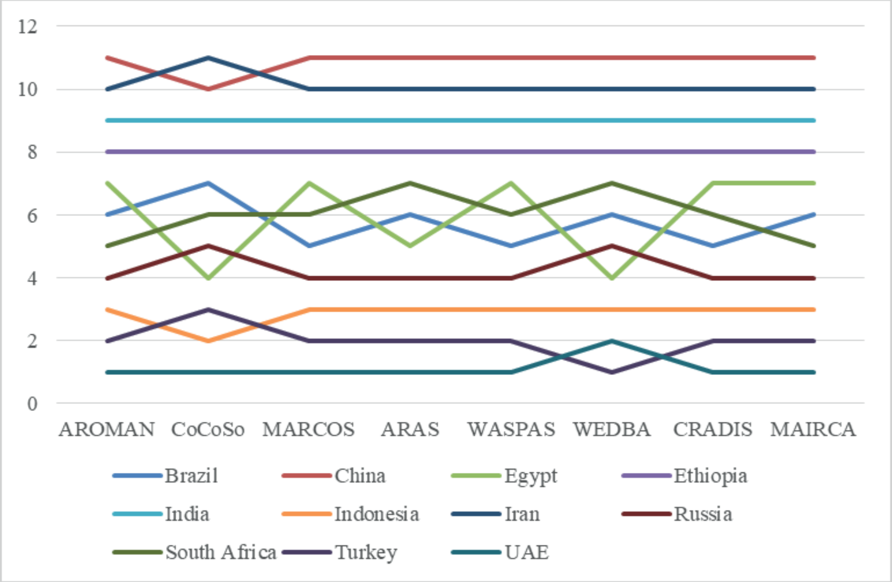

Figure 4. BRICS-T ranking results with MCDM methods according to EFI indicators

According to the results related to the Spearman's analysis it was found statistically significant (at the 1% level) and a very high correlation between the ranking of various MCDM methods that shows the validity, applicability and reliability of the proposed model.

Rank Reversal Test

As additional validation analysis, a rank reversal test is conducted for examining whether the ranking results obtained with the existing model give a stable response to sudden changes. The rank reversal test performed in this study is based on the progressive deletion of sub-optimal alternatives and checking the ranking of the remaining ones. The results related to rank reversal test are shown in Figure 5. The first scenario (Scenario 0) is the initial ranking order acquired via proposed model. The other scenarios (Scenario 1-10) are constructed by progressively removing the alternatives ranked last in the previous rankings from the model one by one.

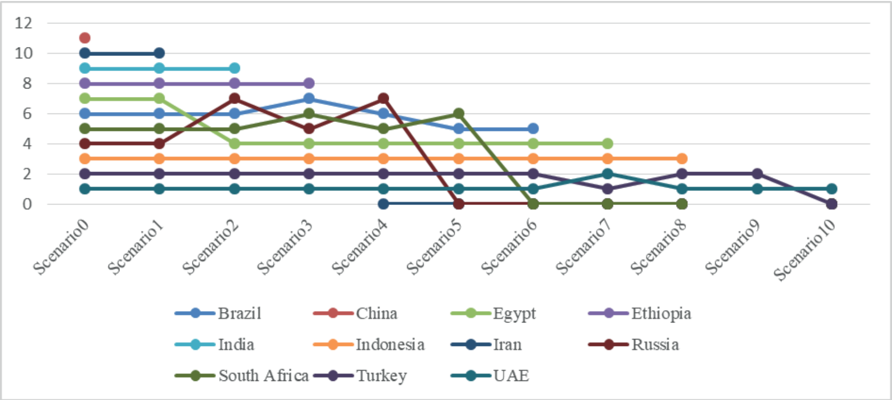

Figure 5. Results related to rank reversal test

According to the Figure 5 it is understood that the proposed model shows a significant sensitivity to rank reversal cases. In terms of the proposed model the ranking of six alternatives (BRE, EGY, RUS, SA, UAE and TR) changed during the process of progressive deletion of sub-optimal alternatives.

CONCLUSION

This study, which focuses on evaluating the overall performance of the economic freedoms of BRICS countries along with Turkey, integrates the MEREC, WENSLO, and AROMAN methods to create a multi-criteria decision-making model. This model can also be described as a decision support system. Using the 2025 data published by the Heritage Foundation, the MEREC and WENSLO objective weighting methods were employed to calculate the importance levels of 12 economic freedom indicators, and the AROMAN technique was used to determine the ranking of the specified countries based on their levels of economic freedom. In light of the results obtained, the most effective criteria playing a role in improving the economic freedom levels of countries have been identified as Fiscal Health, Investment Freedom, and Financial Freedom. In other words, countries that perform well on these criteria are expected to rank higher in the standings. However, the United Arab Emirates (UAE) is the country with the highest level of economic freedom, as it has shown the highest performance in 11 out of 12 indicators. Moreover, it can be observed that Turkey (TR) and Indonesia (INS) perform well in Fiscal Health, Investment Freedom, and Financial Freedom, as well as other criteria (Table 2). China (CHN), Iran (IR), and India (IND) can be said to have low levels of economic freedom. The bureaucratic problems, corruption, and attempts to restrict the freedoms of the middle class in these countries are believed to be the reasons for this outcome. Moreover, the war between Russia and Ukraine can be said to have caused a decline in Russia's level of economic freedom.

In future studies, countries located on the same continent can be evaluated within the framework of their economic freedom levels. Additionally, in future studies, expert opinions can be utilized, and by addressing the uncertainty in expert opinions, Fuzzy MCDM methods can be employed. In this way, economic freedom can be examined by bringing it closer to the real-world problem. With the help of cluster analyses, countries showing similar economic freedom performances can be identified. With forecasting models, the future economic freedom performances of countries can be predicted.

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Conflict of Interest

The authors have declared that there is no conflict of interest.

Author Contributions

BS: Project idea, data collection, data analysis, interpreting the result, literature search, writing the manuscript; ÇK: Project idea, data collection, data analysis, interpreting the result, literature search, writing the manuscript and final check of the manuscript.