EVALUATION OF BRICS COUNTRIES AND TURKEY'S FOREIGN DEBT ACCORDING TO RATIOS AND MULTI-CRITERIA DECISION-MAKING METHODS

Dr. Niyazi GÜMÜŞ
National Defence University Turkish Military Academy

Abstract: *Today, the external debt problem is not only a problem for Developing Countries but also for Developed Countries. Countries may resort to external borrowing in cases where they have a savings deficit, experience resource shortages in external debt repayments or fail to maintain the current account balance. The external borrowings should be used in productive areas with high marginal returns. If the borrowed credits are used for consumption expenditures, external debt payments or in areas with low returns, countries may face the risk of entering an external debt spiral. Therefore, the management of external debt is important. The situation is similar for the BRICS countries and Turkey, which are among the Developing Countries. In order to compare the indebtedness of BRICS countries and Turkey between 2010 and 2023, the countries' indebtedness was assessed using ratios such as the ratio of total external debt to gross domestic product, the ratio of total external debt to exports, the ratio of external debt service to exports, and the current account balance. Research conducted on BRICS countries and Turkey shows that China, India and Russia will not face problems with external debt and that their external debt is sustainable, while South Africa, Turkey and Brazil need to be more cautious in managing their external debt.*

Keywords: **External debt, external dept ratios, sustainability of external debt.**
Jel Codes: **H63, C40, E60.**

1. Introduction

In circumstances where domestic savings prove insufficient to sustain economic development, countries often resort to external financial resources. One of the most significant challenges faced by Less Developed Countries (LDCs) and Developing Countries (DCs) is precisely this shortage of savings. Since export revenues are generally limited, these countries frequently run current account deficits and, when confronted with foreign exchange constraints in meeting debt obligations, they turn to external borrowing. When domestic resources fall short of financing planned investments and broader developmental objectives, external capital flows become a necessary alternative. In this regard, foreign capital, particularly in the form of external borrowing, is perceived as a means of accelerating national development. Nevertheless, the productive use of such loans is crucial. If channeled into high-return sectors, they can contribute meaningfully to economic growth; however, when allocated to low-return or inefficient areas, they risk pushing countries into a cycle of indebtedness.

As the world approached the new millennium, countries were adversely affected by a series of global crises, most notably the financial turmoil that originated in the United States in 2008 and the Covid-19 pandemic, which began in China in 2019 and rapidly spread across the globe. In response, governments implemented monetary stimulus measures to finance public investment, sustain private sector activity, and counteract stagnation in markets. These stimulus packages were largely financed through public borrowing, which in turn led to a significant rise in sovereign debt levels (Gollagari & Perini, 2024, 202). The resulting increase in external debt stocks intensified debt burdens and repayment

obligations, rendering the sustainability of external borrowing a critical issue for many nations.

This study examines the external debt structures of the BRICS countries and Türkiye. Initially formed in 2006 by Brazil, Russia, India, and China under the acronym BRIC, the group adopted the name BRICS in 2010 following the inclusion of South Africa. The organization brings together global powers such as China and Russia alongside leading regional actors like India, Brazil, and South Africa. By 2023, the BRICS countries, with a combined population of approximately 3.3 billion—equivalent to 40 percent of the world's population—accounted for nearly 26 trillion USD in Gross Domestic Product (GDP), representing about 25 percent of global output (World Bank Group, 2024). On 1 January 2024, membership expanded further with the accession of Egypt, Ethiopia, Iran, the United Arab Emirates (UAE), and, with a short delay, Saudi Arabia, raising the total number of member states to ten (BBC, 2024).

The primary objective of this study is to examine the sustainability of external debt in BRICS countries and Türkiye—classified as developing economies with comparable structural features—by analyzing and comparing their external debt dynamics over the period 2010–2023. The assessment relies on key indebtedness indicators, including the ratio of total external debt to GDP, the ratio of total external debt to exports, the ratio of external debt service to exports, and the ratio of external debt service to GDP. These ratios are employed to evaluate the degree of indebtedness and the sustainability of external borrowing in the selected countries. Furthermore, drawing on Multi-Criteria Decision-Making (MCDM) methods, ten economic indicators that influence overall economic performance were identified and weighed using the Statistical Variance Method. Subsequently, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) was applied to rank the countries' economic performances from strongest to weakest. Countries that joined BRICS in 2024 were excluded from the analysis, as they were not members during the period under consideration.

What distinguishes this study from previous research is the combined use of ratio-based evaluation and Multi-Criteria Decision-Making (MCDM) methods. Specifically, ten economic indicators influencing national economic performance were identified, weighed through the Statistical Variance Method, and subsequently ranked using the TOPSIS approach to classify countries' performances from best to worst. Owing to its methodological design and the ranking of countries according to both debt sustainability ratios and broader economic performance, the study is regarded as original and expected to make a meaningful contribution to the existing literature.

2. Conceptual framework

Borrowing is generally defined as the acquisition of funds for a certain period, with the obligation to repay the principal together with interest upon maturity (Esener, 2013, 6). At the time of borrowing, the debtor experiences an increase in available resources, whereas during repayment—when both principal and interest must be settled—a reduction in income occurs.

Private sector entities or public institutions may, at times, resort to borrowing when their available resources prove insufficient to carry out certain investment activities. When national savings rates are low, certain investment projects may either be postponed or financed through borrowing. The savings gap thus constitutes one of the most fundamental reasons why countries rely on debt. In cases where government revenues are inadequate to cover public expenditures, states also turn to borrowing. Such borrowing may be undertaken domestically; however, when internal resources prove insufficient, governments frequently resort to external financing (Akdoğan, 2013; 458–461).

The insufficiency of domestic savings, the low level of export revenues, and the persistent need for foreign exchange drive countries to seek external financing (Danacı, 2020, p. 1678). If external borrowing is directed toward projects capable of generating substantial future income, and repayment obligations can be met without difficulty, such

debt does not pose a serious problem for states. Borrowing is regarded as sustainable insofar as governments retain the ability to service their debts without default (George & Shanmugam, 2023, 1).

Domestic debt refers to borrowing conducted in national markets, where both the repayment of principal and the associated interest are settled in the local currency. In this type of borrowing, the nationality of the lender or bondholder is of little significance; rather, what matters is the market from which the debt is raised and the currency in which repayment is made. Accordingly, even when bonds are sold to foreign individuals or institutions, the debt is still classified as domestic borrowing if repayment is executed in the national currency (Akdoğan, 2013, 461).

External debt refers to liabilities incurred by a state, public institution, organization, or corporation from foreign governments, international institutions, or overseas markets (Ataç, 1986, 31). As the definition suggests, resources obtained by a government from another state, or from international financial institutions such as the World Bank (WB) and the International Monetary Fund (IMF), as well as from global capital markets, constitute external debt. While external borrowing initially generates an inflow of capital and thus contributes to national income, the repayment of principal and interest leads to an outflow of resources, resulting in a contraction of national income (Gümüş, 2021, 15; Esener, 2013, 24).

When public institutions and agencies secure loans from foreign governments or international capital markets, these liabilities are classified as public sector external debt (Esener, 2013, 36). Public external debt is composed of borrowings by the central government, local administrations, the central bank, and other public enterprises. Such debts are typically characterized by long maturities and relatively low interest rates (Evgin, 2000, 1). In contrast, when private sector entities obtain loans from foreign capital and financial institutions, commercial banks, firms, or organizations, these liabilities are categorized as private sector external debt (Esener, 2013, 33).

3. Literature review

A number of studies have examined the sustainability of external debt in BRICS countries and Türkiye. Joy and Panda (2020) argue that the sustainability of public debt in BRICS countries is generally weak, noting that China and India are in a more favorable position compared to other BRICS members, while the 2008 global financial crisis had an adverse impact on public debt sustainability across the group. Ülger Danacı (2020), analyzing the period 2000–2018 for BRICS and MINT countries, finds that periods of high external debt coincide with slower growth, whereas lower debt levels are associated with stronger economic performance. Similarly, Yıldız and Sağdıç (2021), in their study on the effects of external debt on economic growth in BRICS countries and Türkiye, conclude that external borrowing tends to slow down growth. They emphasize that for developing countries to escape the debt trap, external resources must be allocated efficiently to high-return sectors. Gollagari and Perini (2024) observe a negative relationship between debt stock and economic growth in Brazil and Russia, a statistically insignificant negative link in India, and no meaningful relationship between external debt and growth in China and South Africa. Oskay (2024), comparing Türkiye's external debt with that of BRICS countries for the period 2002–2022 using debt ratios, concludes that Türkiye carries a heavier debt burden than BRICS members. While Brazil and South Africa display debt levels similar to Türkiye, they are assessed as less risky; for China, India, and Russia, external debt does not constitute a significant concern. Finally, Mehentar and Mishra (2024), examining the period 2009–2018, report an increase in public debt across BRICS countries, with the ratio of external debt to GDP rising in all members except China.

In some studies conducted on Türkiye, Yılancı and Özcan (2008) examined the sustainability of Türkiye's external debt for the period 1990–2007 using the TAR model and concluded that the country's external debt was unsustainable, while Çukurçayır (2014), in a study covering the years 1980–2010, analyzed the sustainability of Türkiye's external

debt by applying ADF and PP unit root tests together with Engle-Granger and Johansen cointegration tests and reached the conclusion that Türkiye's external debt was sustainable. Dağ and Kızılkaya (2018), by examining the Net External Debt Stock-to-GDP ratio for the period 2004–2017 through the KPSS unit root test, found that Türkiye's external debt was unsustainable, whereas Gümüş (2022), in a study investigating the sustainability of Türkiye's external debt for the years 1991–2020 based on ratios and using ADF, Dickey-Fuller GLS, PP, KPSS, and ERS unit root tests, concluded that the prevailing evidence indicated the sustainability of Türkiye's external debt.

4. The course of external debt in BRICS countries and Türkiye

Developing countries that aim to accelerate their economic growth resort to external resources to compensate for the shortage of capital they need. When savings are insufficient for the realization of investment plans, countries either resort to the use of external financing or accept a slower pace of development. The recourse to external resources, however, leads to an increase in external debt.

Table 1: BRICS Countries and Türkiye's External Debt Trends (Billion Dollars)

Years	Brazil	Russia	India	China	South Africa	Türkiye
2010	352	418	290	743	115	317
2011	404	544	334	1.050	124	321
2012	440	592	392	1.148	148	353
2013	483	668	427	1.480	141	402
2014	557	554	457	1.778	149	414
2015	543	518	479	1.334	128	400
2016	543	512	455	1.414	144	399
2017	543	518	511	1.711	175	447
2018	558	455	521	1.961	180	427
2019	569	491	561	2.114	191	415
2020	549	467	565	2.326	175	430
2021	571	488	612	2.724	169	436
2022	579	385	615	2.448	172	458
2023	607	320	647	2.420	166	499

Source: World Bank Group, 2024a, T.C. Ticaret Bakanlığı, 2024: 2

Table 1 presents the course of external debt in BRICS countries and Türkiye during the period 2010–2023. Over the 14-year period, while Russia's external debt decreased by 23 percent, an increase is observed in the external debts of the other countries. The increase in South Africa's external debt is 44 percent, the increase in Brazil's external debt is 72 percent, the increase in India's external debt is 123 percent, and the increase in China's external debt is 225 percent. The increase in Türkiye's external debt is observed to be 57 percent. When BRICS countries and Türkiye are compared, it is seen that the increase in Türkiye's external debt is lower than the increase in Brazil, India, and China. The increase in India's and China's external debt is estimated to be related to the high pace of development in these countries and the use of external resources to achieve such rapid growth.

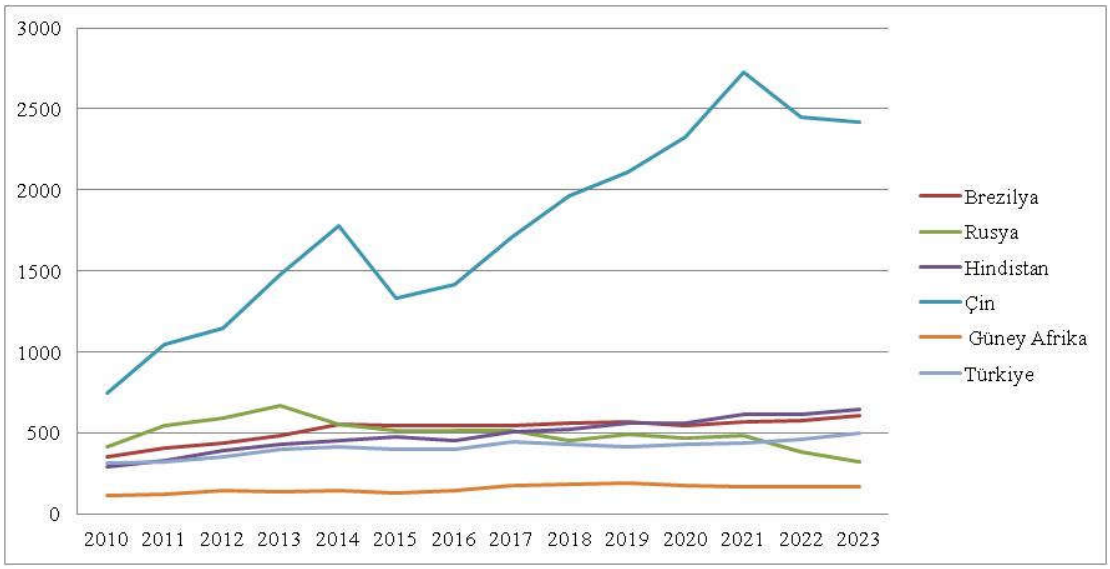

Figure 1: BRICS Countries and Türkiye's External Debt Trends

Source: World Bank Group, 2024a; T.C. Ticaret Bakanlığı, 2024.

5. RATIOS DETERMINING THE LEVEL OF INDEBTEDNESS OF COUNTRIES

In determining the level of indebtedness of countries, certain ratios are taken into account. According to specific criteria set by the World Bank and the IMF, attempts are made to assess the debt situation of countries and to decide whether their external debts are sustainable. In this section, the sustainability of external debt is examined on the basis of some of these ratios.

5.1. Evaluation According to the Total External Debt-to-GDP Ratio

There are certain indicators that measure the economic situation of countries, and foremost among them is GDP. GDP is defined as the total monetary value of final goods and services produced within a country's borders during a given period (Yıldırım, Karaman, & Taşdemir, 2010, 15). GDP reflects the size of a country's economy. When assessing the level of indebtedness in relation to external debt, the ratio of total external debt stock to GDP is primarily taken into account. This ratio is regarded as a significant factor in determining the external debt burden of countries, as well as in measuring their risk profile and creditworthiness. If the ratio of external debt to GDP exceeds the prescribed threshold, external debt may become unsustainable. Such a situation increases the cost of borrowing for the country and may lead to a debt spiral (George & Shanmugam, 2023, 1).According to the criteria established by the World Bank and the IMF, if the ratio of a country's total external debt stock to GDP is below 30 percent, the country is considered to be lightly indebted. If the ratio falls within the 30–50 percent range, the country is regarded as moderately indebted, while a ratio above 50 percent indicates that the country is highly indebted (Evgin, 1996, 77).

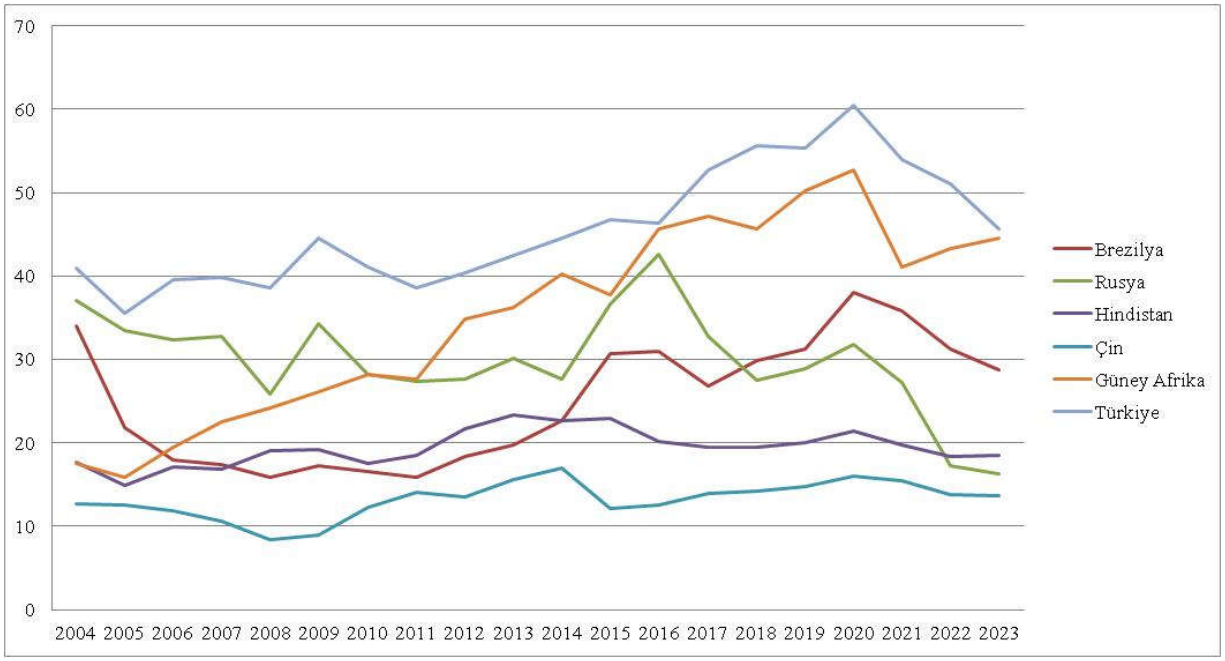

Figure 2: Total External Debt/GDP Ratio of BRICS Countries and Türkiye for the Period 2004-2023 (%)

Source: World Bank Group, 2024a; T.C. Ticaret Bakanlığı, 2024. 2; Gerede, 2023: 68

In Figure 2, the ratio of total external debt to GDP in BRICS countries and Türkiye for the period 2004–2023 is presented. In the mentioned period, it is observed that this ratio in Brazil ranged between 16–38 percent and was 28.8 percent in 2023. In Russia, the ratio of total external debt to GDP ranged between 16–42 percent, and in 2023 it was 16.3 percent. In India, it ranged between 15–23 percent and was 18.5 percent in 2023. In China, it ranged between 8–17 percent, and in 2023 it was 13.7 percent. In South Africa, the ratio of total external debt to GDP ranged between 16–53 percent, and in 2023 it was 44.5 percent. When we evaluate BRICS countries according to the ratio of total external debt stock to GDP, it is seen that India and China are lightly indebted countries, Brazil is generally moderately indebted, Russia was generally moderately indebted until 2020 and, after that date, the ratio of total external debt to GDP decreased and the country became lightly indebted, while South Africa is generally in the category of moderately indebted countries. Looking at Türkiye, it is observed that the ratio of total external debt to GDP ranged between 35–60 percent, that this ratio is higher in Türkiye compared to BRICS countries, and that Türkiye was considered a highly indebted country in the period 2017–2022, but with the growth of GDP, this ratio was 45.6 percent in 2023. Although Türkiye has recently been regarded as a moderately indebted country according to this ratio, it still needs to further increase its production in order to reduce the ratio of total external debt to GDP.

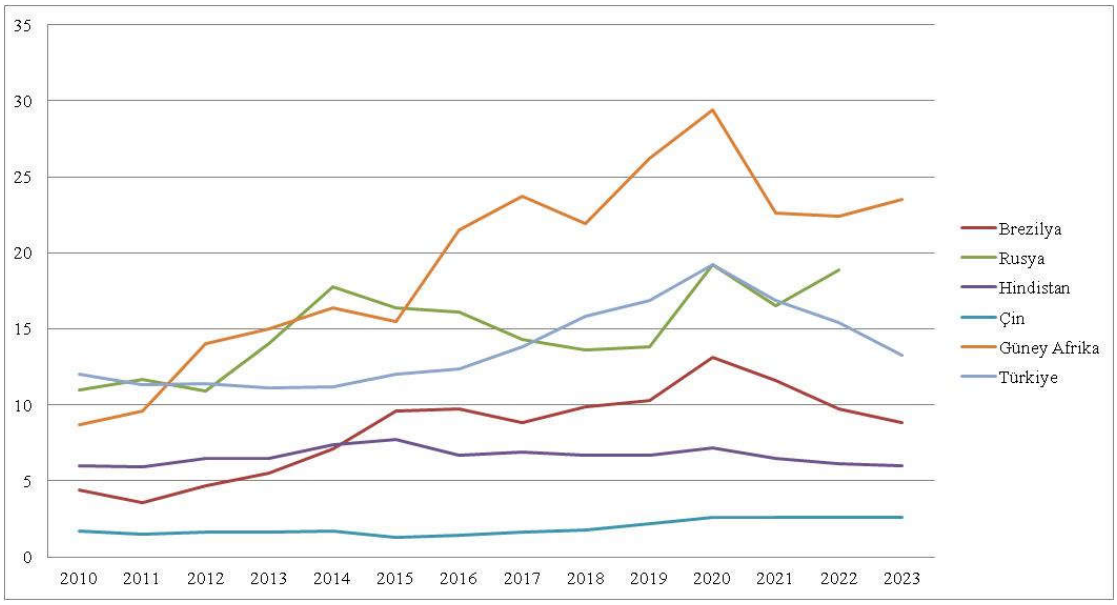

Figure 3: BRICS Countries and Türkiye's Public and Public Guaranteed External Debt to GDP Ratio for the Period 2010-2024 (%)

Source: World Bank, 2024c; World Bank, 2025a; BTI, 2014, 2018, 2022, 2024. The calculations have been made by us.

In Figure 3, the ratio of public and publicly guaranteed external debt to GDP in BRICS countries and Türkiye for the period 2010–2023 is presented. This ratio ranged between 1.3–2.6 percent in China, 5.9–7.7 percent in India, 3.6–13.1 percent in Brazil, 11–19.2 percent in Russia, 8.7–29.4 percent in South Africa, and 11–19.2 percent in Türkiye. According to the Maastricht Criteria, the ratio of public debt to GDP in European Union (EU) member states must not exceed 60 percent (Republic of Türkiye Ministry of Foreign Affairs, 2022). If this ratio is exceeded, countries are considered to be highly indebted. Accordingly, it is observed that none of these countries fall into the category of highly indebted countries. One of the issues to be taken into consideration here is the relationship between the growth of external debt and the growth of GDP. If the economy grows continuously and at a sufficient rate, if the rate of GDP growth is higher than the growth rate of public debt, and if a decline is observed in the ratio of external debt to GDP, it is argued that external debt is not alarming (Yıldırım, Karaman, & Taşdemir, 2010, 437). In Türkiye, the ratio of public and publicly guaranteed external debt to GDP, which had been increasing until 2020, has since followed a downward trend and shows a positive outlook.

5.2. Evaluation of Countries' Debts According to the Total External Debt-to-Export Ratio

Another ratio used in determining the level of indebtedness of countries is the ratio of total external debt stock to exports. This ratio also indicates the debt repayment capacity of countries. If the ratio of total external debt to exports is below 165 percent, the country is considered to be lightly indebted; if it is in the 165–275 percent range, the country is regarded as moderately indebted; and if it is above 275 percent, the country is considered to be highly indebted (Evgin, 2000, 67).

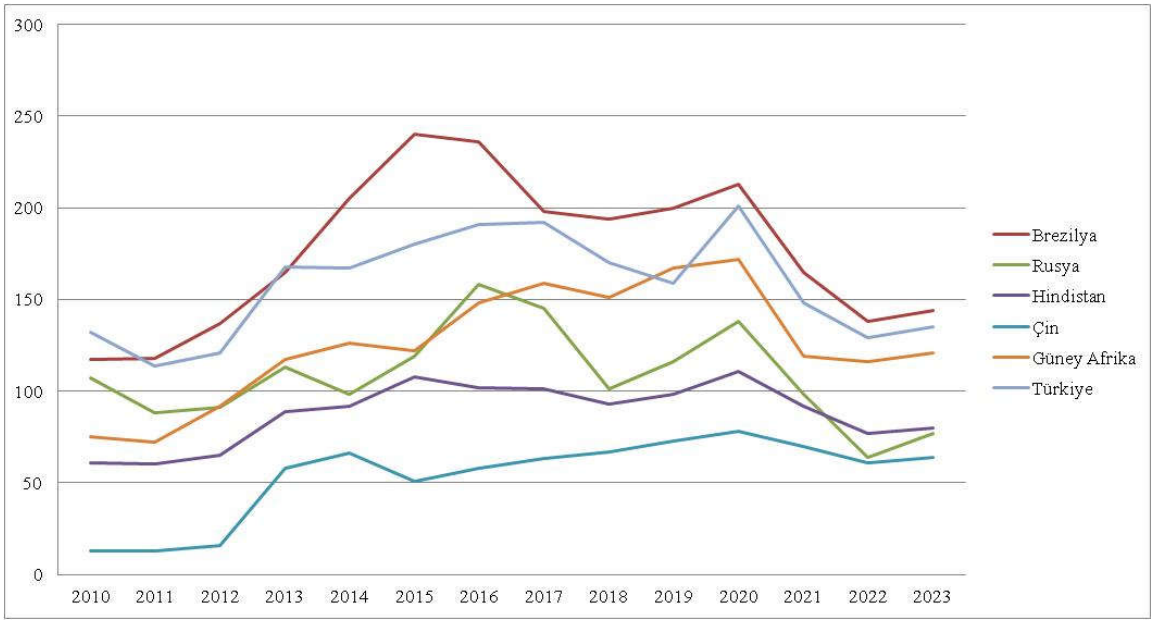

Figure 4: BRICS Countries and Türkiye's Total External Debt/Export Ratio (%)

Source: World Bank Group, 2024a; T.C. Ticaret Bakanlığı, 2024: 2

In Figure 4, the ratio of total external debt to exports of BRICS countries and Türkiye between 2010 and 2023 is presented. When we examine the countries, it is seen that in Brazil this ratio ranged between 117–240 percent during the mentioned period, showed a downward trend after 2020, and was 144 percent in 2023. In Russia, it ranged between 64–158 percent, showed a downward trend after 2016, and was 77 percent in 2023. In India, it ranged between 60–111 percent and followed a stable course, and in 2023 this ratio was 80 percent. In China, it ranged between 13–78 percent, and as in India, the ratio of total external debt to exports in China also followed a stable course. In South Africa, it ranged between 72–172 percent, entered a downward trend after 2020, and was realized as 121 percent. In Türkiye, it ranged between 114–201 percent, showed a downward trend after 2020, and was 135 percent in 2023. Although the ratio of total external debt to exports in Türkiye is slightly above that of BRICS countries, it is seen that according to this ratio the countries under examination are in the category of lightly indebted countries.

5.3. Evaluation of Countries' Debts According to the External Debt Service-to-Export Ratio

The ratio of total external debt service to exports is also one of the important ratios in measuring a country's indebtedness. Also referred to as the debt service-to-export ratio, it shows what proportion of a country's annual export revenues is allocated to external debt repayments. A high level of this ratio causes the country to face liquidity problems (Evgin, 2000, 68). If the ratio of external debt service to exports is below 18 percent, the country is considered to be lightly indebted; if it is between 18–30 percent, the country is considered to be moderately indebted; and if it is above 30 percent, the country is regarded as highly indebted (Evgin, 1996, 78).

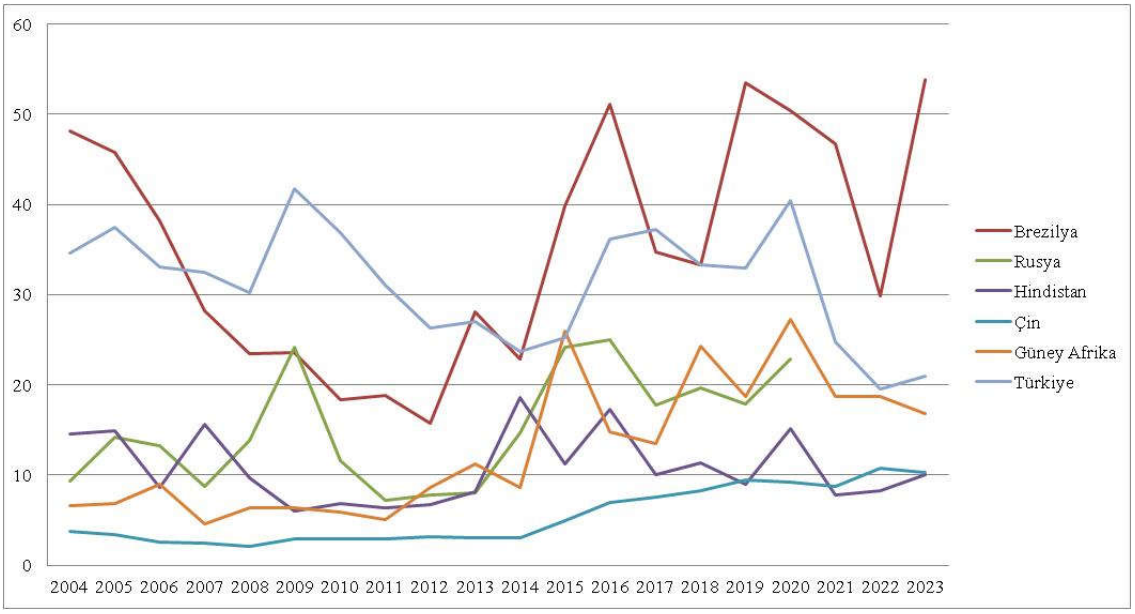

Figure 5: BRICS Countries and Turkey's Total External Debt Service/Exports Ratio (%)

Source: World Bank Group, 2024b; Gerede, 2023: 72

In Figure 5, the ratio of total external debt service to export revenues in BRICS countries and Türkiye for the period 2004–2023 is presented. According to this ratio, in Brazil it ranged between 16–54 percent, and while the country was considered moderately indebted in the period 2007–2014, it was regarded as highly indebted in other periods. Based on 2023 data, the ratio was 53.8 percent. In Russia, the ratio ranged between 8–23 percent, and although the country appeared to be moderately indebted in some periods, it was generally considered lightly indebted. According to 2020 data, the ratio was 22.9 percent. In India, the ratio of external debt service to exports ranged between 6–18 percent, and it was 10.1 percent in 2023. In China, the ratio of external debt service to export revenues varied between 2–11 percent, and according to 2023 data, China's external debt service accounted for 10.3 percent of its exports. Based on these figures, China and India are in the category of lightly indebted countries.

In South Africa, the ratio of external debt service to exports ranged between 5–26 percent, and since it was generally below the 18 percent threshold, the country was considered lightly indebted. In 2023, the ratio was measured at 16.8 percent. When we examine Türkiye, the ratio of external debt service to exports ranged between 19–42 percent. Until 2020, the ratio was generally above 30 percent, but starting from 2021 it began to decline, and in 2023 it was 21 percent. According to this ratio, it can be stated that Türkiye was highly indebted until 2020, whereas in the period after 2020 it was moderately indebted.

Apart from the amount of debt, there are certain criteria that determine the level of indebtedness of countries. One of these is the country's capacity to repay its external debts, meaning the situation in which the country does not face difficulties in meeting its obligations (Navarro Ortiz & Sapena, 2020, 142). In external borrowing, it is essential that countries do not fall into a risky position when repaying their debts with interest and that debt remains at sustainable levels (Yıldız & Sağdıç, 2021, 840). Therefore, the returns of the external debts used should be sufficient to cover their repayment with interest; in other words, their marginal return should be greater than their marginal cost (Gülcemal, 2021, 197; Türk, 2023, 454). Countries with high levels of external debt that encounter difficulties in repayment may enter a debt spiral. Developing countries began to experience problems in debt repayment after the 1980s, and those without reserves sufficient to repay their external debts faced debt crises (Oskay, 2024, 2). The ratio of external debt service to GDP

shows how much of a country's annual income is allocated to external debt payments. A low ratio indicates that countries will not experience difficulties in repaying external debt, while a high ratio demonstrates the large amount of resources transferred abroad (Gedikli, 1997, 25; Gümüş, 2021, 91).

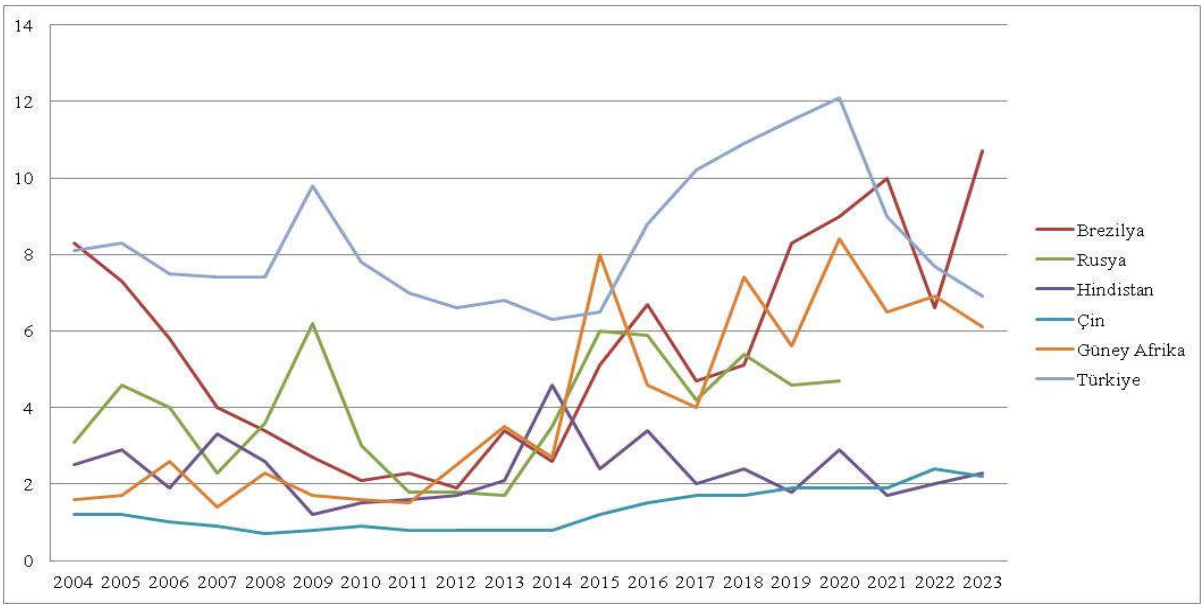

Figure 6: Total External Debt Service/GDP Ratio (%)

Source: World Bank Group, 2023; Russia GDP, 2023; Gerede, 2023: 72

In Figure 6, the ratio of external debt payments to GDP in BRICS countries and Türkiye is presented. The ratio ranged between 1–2 percent in China, 1–3 percent in India, 2–6 percent in Russia, 1–8 percent in South Africa, 2–11 percent in Brazil, and 6–12 percent in Türkiye.

Table 2: Foreign Trade Indicators of BRICS Countries and Türkiye for the Period 2010–2023 (Billion USD)

Years	Indicator	Brazil	Russia	India	China	South Africa	Türkiye
2010	Export	240	445	375	1.650	107	164
	Import	263	322	450	1.430	103	198
	Balance	-23	123	-75	220	4	-34
2011	Export	303	574	447	2.010	127	193
	Import	323	409	566	1.830	123	254
	Balance	-20	165	-119	180	4	-61
2012	Export	293	594	448	2.180	118	214
	Import	326	447	571	1.940	123	250
	Balance	-33	147	-123	240	-5	-36
2013	Export	290	592	472	2.350	114	228
	Import	347	468	527	2.120	122	275
	Balance	-57	124	-55	230	-8	-47
2014	Export	270	558	468	2.460	110	236
	Import	336	426	529	2.240	116	268
	Balance	-66	132	-61	220	-6	-32
2015	Export	232	391	417	2.360	96	212
	Import	253	281	465	2.000	100	229

	Balance	-21	110	-48	360	-4	-17
2016	Export	224	330	440	2.200	91	201
	Import	217	263	480	1.940	89	219
	Balance	7	67	-40	260	2	-18
2017	Export	258	410	498	2.420	104	223
	Import	243	327	582	2.210	100	255
	Balance	15	83	-84	210	4	-32
2018	Export	280	510	538	2.660	111	243
	Import	273	344	640	2.560	109	244
	Balance	7	166	-102	100	2	-1
2019	Export	264	481	529	2.630	106	252
	Import	276	352	602	2.500	104	229
	Balance	-12	129	-73	130	2	23
2020	Export	243	381	499	2.730	93	210
	Import	234	305	510	2.370	78	232
	Balance	9	76	-11	360	15	-22
2021	Export	319	549	678	3.550	131	293
	Import	310	376	761	3.090	105	290
	Balance	9	173	-83	460	26	3
2022	Export	383	635	778	3.720	136	350
	Import	374	345	897	3.140	128	386
	Balance	9	290	-119	580	8	-36
2023	Export	393	425	779	3.510	125	357
	Import	342	285	859	3.130	123	384
	Balance	51	140	-80	380	2	-27
Total current balance		-125	1.785	-1.073	3.930	46	-337

Source: World Bank Group, 2025b; 2025c; WITS, 2022.

The current account is significant in the external economic relations of countries since it covers the export and import of final goods and services produced within a given year (Seyidoğlu, 2009, p. 320). The difference between a country's exports and imports is called the trade balance. In other words, the trade balance refers to the ratio of exports to imports. In addition, countries have service revenues and expenditures that consist of sub-items such as tourism, transportation, financial activities, construction services, official services, and other services (Dinler, 2015, 590). When current transfers are added to the export and import of goods and services, the current account balance is obtained. Countries with a trade deficit will resort to selling certain assets to foreigners or to external borrowing in order to reduce or eliminate this deficit (Yıldırım, Karaman, & Taşdemir, 2010, 73). Countries with a balance of payments deficit initially make use of official foreign exchange reserves to cover the gap, and when these reserves are insufficient, they resort to obtaining loans from external sources. Although this method may seem like a solution in the short term, it does not appear possible to sustain it in the long term. This is because a persistent current account deficit leads to the depletion of a country's reserves, the increase of its external debts, and ultimately pushes the country into a debt spiral (Dinler, 2015, 595–597). Therefore, it is important for countries not to run a trade deficit, and the trade deficit is among the major problems faced by many countries.

In Table 2, the goods and services exports, goods and services imports, and trade balance of BRICS countries and Türkiye for the period 2010–2023 are presented. When we examine the countries, it is seen that the largest current account deficit is in India, followed by Türkiye and Brazil. While South Africa pursued a balanced trade policy by generating a small current account surplus, Russia and China recorded significant current account surpluses. As seen in the table, India, Türkiye, and Brazil, which have current account

deficits, need to develop policies that increase exports and reduce imports in order to achieve current account balance.

6. Method

In this study, the economic performance of BRICS countries and Türkiye, which seeks to become a member of this community, was obtained and ranked by comparatively analyzing the economic indicators specified in the previous sections. In this context, Multi-Criteria Decision-Making Methods were employed. Ten economic indicator criteria that influence the determination of countries' economic performance were established, and these indicators were weighted using the Statistical Variance Method. Subsequently, the countries were ranked from best to worst in terms of their economic performance by applying the TOPSIS method.

6.1. Multi-Criteria Decision-Making Methods

In the decision-making process, the number of alternatives and the factors influencing the selection of these alternatives are of great importance. As the number of alternatives and influencing factors increases, the process becomes more complex, and therefore multi-criteria decision-making (MCDM) methods are required in order to reach the best solutions and make the most accurate decisions. There are nearly 200 MCDM methods in the literature (Abdulvahitoğlu, Vural, & Macit, 2024, 7). In MCDM methods, the procedures are generally carried out by following the steps shown in Figure 3.

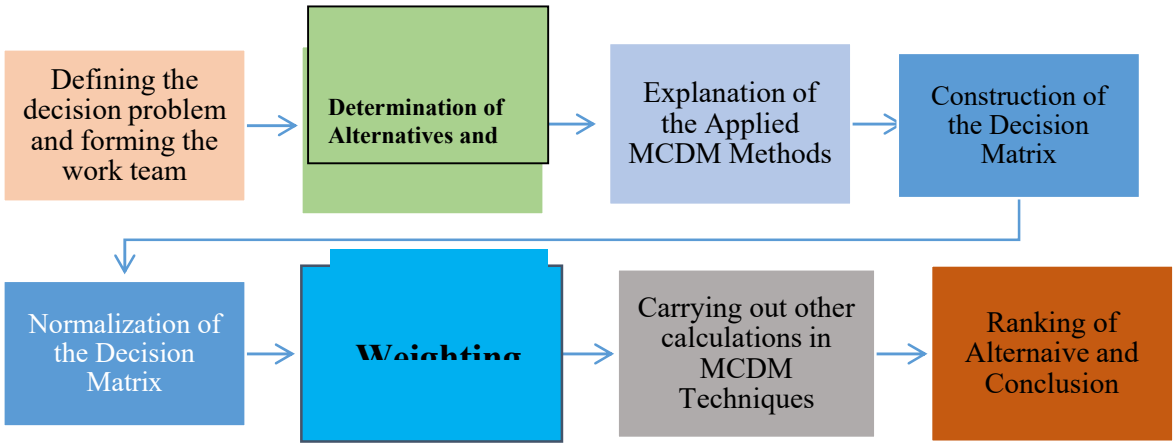

Figure 7: Multi-Criteria Decision-Making Process (Abdulvahitoglu, Abdülvahitoğlu ve Cengiz, 2024a: 5).

6.2. Statistical Variance

The Statistical Variance (SV) method, also referred to as statistical variance, was developed in 2010 by Rao and Patel to be used for determining the objective weights of the criteria to be evaluated (Yürüyen, Ulutaş, & Özdağoğlu, 2023, 735; Yeşilyurt & Selamzade, 2020, 1363). The calculation steps used in the SV method are presented below (Rao et al., 2010, 4739). The stages of the study are shown in Figure 7.

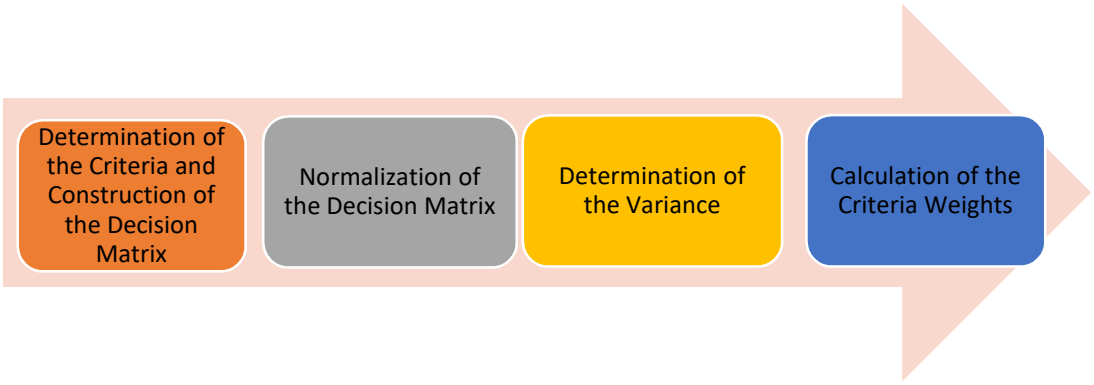

Figure 8: Stages of the Statistical Variance Method (Prepared by the Author)

Step 1. Construction of the Decision Matrix A: The initial decision matrix is constructed as shown in Equation (1).

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix} \quad (1)$$

Step 2. Normalization of the Decision Matrix: The decision matrix A is normalized using Equation (2) for benefit-oriented criteria and Equation (3) for cost-oriented criteria.

$$a_{ij}^{*} = \frac{X_{ij} - X_j^{min}}{X_j^{max} - X_j^{min}} \quad (2)$$

$$a_{ij}^{*} = \frac{X_j^{max} - X_{ij}}{X_j^{max} - X_j^{min}} \quad (3)$$

Step 3. Determination of the Variance Values of the Criteria: For each criterion, the variance (σ^2) value is calculated using Equation (4). In the equation, V_j represents the variance of the data corresponding to the j-th criterion.

$$V_j = \left(\frac{1}{n}\right) \sum_{i=1}^{n} \left(a_{ij}^{*} - \bar{a}_{ij}^{*}\right)^2 \quad (4)$$

Step 4. Calculation of the Weights of the Criteria: The weight of each criterion is determined using Equation (5).

$$W_{jSV} = \frac{V_j}{\sum_{i=1}^{m} V_j} \quad (5)$$

6.3. TOPSIS Method and Application Stages

The TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method was developed by Hwang and Yoon to rank existing alternatives according to specified criteria in decision-making problems. In this method, the criteria are evaluated according to their positive and negative distances from the ideal solution, and the optimum result is obtained (Hwang & Yoon, 1981, pp. 93–95). It is one of the MCDM techniques that assists decision-makers in evaluating alternatives in various fields of life according to predetermined parameters. This technique is based on identifying the option that is closest to the ideal solution with the best values, while also taking into account the option that is farthest from the undesired negative solution or outcomes. Since TOPSIS provides convenience to decision-makers in real problems, it is frequently used in academic studies. The application stages of the TOPSIS method are shown in Figure 4.

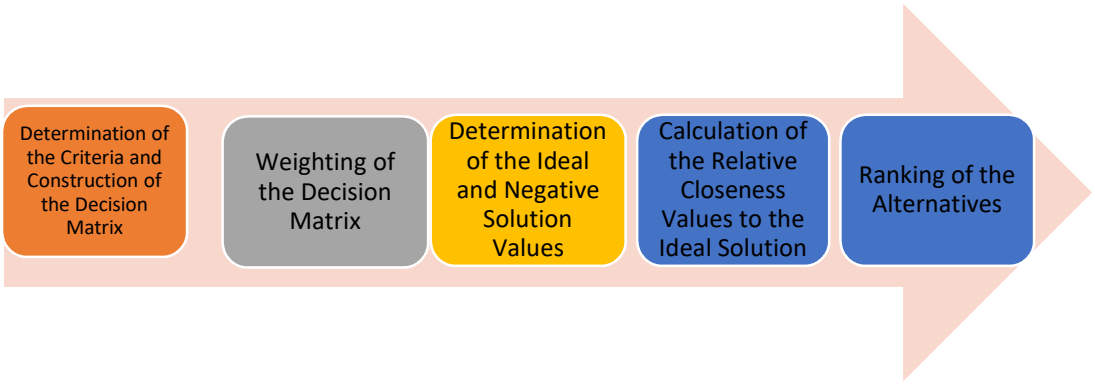

Figure 9: Stages of the TOPSIS Method (Prepared by the Author)

The steps of the TOPSIS method are specified below, and the ranking of the alternatives is carried out by applying Equations (6)–(12) (Selamzade et al., 2023, p. 15700; Abdulvahitoğlu, Abdülvahitoğlu, & Cengic, 2024a, 6; Nennioğlu, Abdülvahitoğlu, & Dal, 2024, 10).

Step 1. Definition of the Criteria and Construction of the Decision Matrix: In this stage, the alternatives are written in the rows and the criteria to be used in the evaluation of the alternatives are written in the columns, and the decision matrix D is constructed according to Equation (6). Subsequently, the standardized decision matrix R is constructed using Equation (7).

$$D_{ij} = \begin{bmatrix} d_{11} & d_{12} & \dots & d_{1n} \\ d_{21} & d_{22} & \dots & d_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ d_{m1} & d_{m2} & \dots & d_{mn} \end{bmatrix} \quad (6)$$

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}} \quad (7)$$

Step 2. Construction of the Weighted Decision Matrix: At this stage, the significance levels (w_i), which have been previously determined by another MCDM technique, are used. The values in the standardized decision matrix R are multiplied by the w_i values of the criteria, and thus the weighted decision matrix V is obtained. The ideal solution set in the V matrix is formed using Equation (8), and the negative ideal solution set is formed using Equation (9).

$$S^* = \left\{ \left(\max_i v_{ij} \middle| j \in J \right), \left(\min_i v_{ij} \middle| j \in J' \right) \right\} \quad (8)$$

$$S^- = \left\{ \left(\min_i v_{ij} \middle| j \in J \right), \left(\max_i v_{ij} \middle| j \in J' \right) \right\} \quad (9)$$

Step 3. Determination of the Deviations from the Ideal and Negative Solution Sets: In Equations (8) and (9), the benefit (maximization) value is represented by , while denotes the loss (minimization) value. Deviations from the ideal solutions are calculated using Equation (10), and deviations from the negative ideal solutions are calculated using Equation (11).

$$S_i^* = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^*)^2} \quad (10)$$

$$S_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2} \quad (11)$$

Step 4. Calculation of the Relative Closeness Values to the Ideal Solution: In this stage, the alternatives used in the method are ranked according to the values obtained from Equation (12), which are based on the ideal deviations and negative ideal deviations.

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^*} \quad (12)$$

Step 5. Ranking of the Alternatives with the Closeness Values to the Ideal Solution: The values obtained by the alternatives, which range between 0 and 1, are ranked from highest to lowest.

By ranking the C*_i values obtained from the calculations in descending order, the alternatives are ordered accordingly.

7. Discussion and findings

The economic indicators of BRICS countries and Türkiye, which form the basis of the evaluation, are presented below in Table 3.

Table 3: Economic Indicators for BRICS Countries and Türkiye in 2023

Country	Population (000)	GDP (Billion $)	Current account balance (Billion $)	Per Capita Income ($)	Total External Debt (Billion$)	Per Capita External Debt ($)	Total external dept /GDP (%)	Total external dept /exports (%)	External debt service/Exports (%)	External debt service /GDP (%)
Criterion Direction	max	max	max	max	min	min	min	min	min	min
Brazil	216422	2170	51	10026	607	2805	28,8	144,0	53,8	10,7
Russia	144444	2020	140	14000	318 (320??)	2201	15,7 (16,3??)	77,0	22,9	4,7
India	1428627	3570	-80	2499	647	453	18,5	80,0	10,1	2,3
China	1425671	17790	380	12478	2420	1697	13,7	64,0	10,3	2,2
South Africa	60414	407	2	6737	166	2747	44,5	121,0	16,8	6,1
Türkiye	85372	1120	-27	13119	499	5845	45,6	135,0	21,0	6,9

Source: TÜİK, 2024; World Bank Group, 2024;T.C. Ticaret Bakanlığı, 2024, The per capita calculations have been carried out by the author.

As a result of the calculations of the economic indicators specified in Table 3 using the Statistical Variance method with Equations (1)–(5), the weights of the indicators have been determined as shown below in Table 4.

Table 4: Weights of Economic Indicators

Country	Population (000)	GDP (Billion $)	Current account balance	Per Capita Income ($)	Total External Debt (Billion$)	Per Capita External Debt ($)	Total external dept /GDP (%)	Total external dept /exports (%)	External debt service/Exports (%)	External debt service /GDP (%)
Weights	0,1517	0,0899	0,0813	0,1369	0,0839	0,0696	0,1264	0,1125	0,0593	0,0885

Subsequently, the TOPSIS method was applied to calculate the economic performances of the countries. The matrix expressed in Equation (6) corresponds to Table 3. By multiplying the values in Table 3 with the weights in Table 4, the weighted matrix was obtained. Thereafter, using Equations (10)–(12), the performance indicators of the countries were determined, and the final ranking was established. The weighted normalized matrix is presented in Table 5, and the final result is shown in Table 6.

Table 5: Weighted Normalized Matrix

Country	Population (000)	GDP (Billion USD)	Current Account Balance (Billion USD)	Per Capita Income (USD)	Total External Debt (Billion USD)	Per Capita External Debt (USD)	Total External Debt/GDP (%)	Total External Debt/Exports (%)	External Debt Service/Exports (%)	External Debt Service/ GDP (%)
Brazil	0,0161	0,0106	0,0099	0,0627	0,0192	0,0257	0,0484	0,0612	0,0484	0,0622
Russia	0,0108	0,0099	0,0273	0,085	0,0101	0,0202	0,0264	0,0327	0,0206	0,0273
India	0,1063	0,0174	-0,0156	0,0156	0,0205	0,0042	0,0311	0,0340	0,0091	0,0134
China	0,1061	0,0868	0,0741	0,0780	0,0766	0,0156	0,0230	0,0272	0,0093	0,0128
South Africa	0,0045	0,0020	0,0004	0,0421	0,0053	0,0252	0,0747	0,0514	0,0151	0,0355
Türkiye	0,0064	0,0055	-0,0053	0,0820	0,0158	0,0536	0,0766	0,0574	0,0189	0,0401

Table 6: Ranking of Countries By Economic Performance

Country	s+	s-	c*	Ranking
Brazil	0,157784	0,09821	0,383633	6
Russia	0,156925	0,11319	0,419044	3
India	0,132735	0,15229	0,5343	2
China	0,072367	0,20272	0,73693	1
South Africa	0,169866	0,09921	0,368706	4
Türkiye	0,173505	0,10909	0,386031	5

As a result of the calculations, among the BRICS members the countries with the best economic indicators were ranked as China, India, and Russia, respectively. Türkiye is placed in fifth position and, except for Brazil, is seen as more indebted compared to the other countries.

8. Conclusion and Recommendations

The external debt problem is among the major issues faced by many countries. Nations attempt to take various measures to address this problem. There are certain criteria used to measure the level of indebtedness of countries. When evaluating the indebtedness of nations, it is necessary to assess them not by the absolute amount of external debt, but according to internationally established criteria. This is because the external debt of one country may be greater than that of another; however, if the country with higher debt also has larger revenues such as GDP and exports, the ratio of external debt to GDP and exports may in fact be lower than in the country with less debt. Countries with lower ratios of external debt service to GDP and exports may have a higher capacity to repay their external debts. Therefore, in evaluating countries, the assessment should be made not by the absolute amount of debt, but according to criteria such as the ratio of total external debt to GDP, the ratio of total external debt to exports, the ratio of public and publicly guaranteed external debt to GDP, and the ratio of external debt service to GDP and exports. In addition, the current account deficit, which often necessitates external borrowing, should not be overlooked.

In the study conducted for BRICS countries and Türkiye, the debt situations of the countries were examined and compared according to certain ratios such as the ratio of total external debt to GDP, the ratio of total external debt to exports, the ratio of public and publicly guaranteed external debt to GDP, and the ratio of external debt service to GDP and exports. According to the ratio of total external debt to GDP, it was observed that India and China were lightly indebted, Russia was moderately indebted in the early years but lightly indebted in recent years, Brazil and South Africa were moderately indebted, and Türkiye was highly indebted in the period 2017–2022 and moderately indebted in other periods.

According to the ratio of total external debt to exports, it was observed that the ratios of Brazil, South Africa, and Türkiye were close to each other, while in the other countries the ratio was lower, and based on this ratio BRICS countries and Türkiye have recently been regarded as lightly indebted.

According to the ratio of external debt service to exports, Brazil was highly indebted, Türkiye was highly indebted until 2020 and moderately indebted in the subsequent period, while the other BRICS countries were generally in the category of lightly indebted. In addition, when evaluated in terms of the current account balance, which is one of the factors driving countries to external borrowing, it was observed that India, Türkiye, and Brazil had current account deficits, South Africa was in balance, and Russia and China recorded current account surpluses. Countries with current account deficits need to develop policies to close these gaps.

In order to measure the indebtedness and economic performance of BRICS countries and Türkiye, comparisons were made using Multi-Criteria Decision-Making Methods in addition to ratios. Ten economic indicator criteria affecting the determination of the economic performance of countries were established and weighted by the Statistical Variance Method. Subsequently, the TOPSIS method was applied to rank the countries from best to worst according to their economic performance. Based on this ranking, the countries were ordered as China, India, Russia, South Africa, Türkiye, and Brazil.

As a result, it is considered that external debts are at sustainable levels for BRICS countries and Türkiye, with no significant problems observed in the cases of China, India, and Russia, while South Africa, Türkiye, and Brazil are regarded as needing to act more cautiously with respect to external debt. It is considered important for the sustainability of external debt that countries which need to act prudently pursue trade policies that increase exports and reduce current account deficits, and that the loans obtained are used in high-return areas that generate foreign exchange for the country. Therefore, Türkiye, which is also among the countries that need to act cautiously regarding external debt, should adopt policies that increase exports and promote tourism—one of the items of the current account balance—in order to raise tourism revenues and turn the current account balance positive, which would make a significant contribution to reducing the external debt burden.

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