ANALYSIS OF DEMOCRACY PERFORMANCES OF G7 COUNTRIES: AN APPLICATION WITH PSI METHOD

Furkan Fahri ALTINTAŞ[1]

Abstract

With the advancement of democracy in a country, sustainable development, innovation, economic growth and progress can be achieved. Therefore, the progress of major economies in democracy can influence the global economy. In this context, the research measured the democracy performance of G7 countries, which account for more than half of global capital, using the Democracy Index (DI) components data created by The Economist Intelligence Unit (TEIU), the most recent and up-to-date data available, through the PSI multi-criteria decision-making (MCDM) method. According to the PSI (Preference Selection Index) method, the democracy performance of countries was ranked as Canada, Germany, the United Kingdom, Japan, France, Italy, and the USA. Furthermore, the average democracy performance value of countries was calculated, and it was observed that the countries with performance lower than this value were the United Kingdom, Japan, France, Italy, and the USA. Therefore, it is considered that the countries with lower-than-average democracy performance need to improve their democracy performance to contribute more to the global economy. Additionally, according to sensitivity, comparative, and simulation analyses in the research, it was concluded that the democracy performance of countries can be measured using the PSI method within the scope of the DI.

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G7 ÜLKELERİNİN DEMOKRASİ PERFORMANSLARININ ANALİZİ: PSI YÖNTEMİ İLE BİR UYGULAMA

Öz

Bir ülkede demokrasinin ilerlemesiyle sürdürülebilir kalkınma, inovasyon ve bunlara bağlı olarak ekonomik büyüme ve gelişme sağlanabilmektedir. Dolayısıyla büyük ekonomilerin demokrasi konusundaki gelişimleri küresel ekonomiyi etkileyebilmektedir. Bu kapsamda araştırmada, küresel sermayenin yarısından fazlasına sahip olan G7 ülkelerinin demokrasi performansları en son ve güncel olan The Economist Intelligence Unit (TEIU) kurumu tarafından oluşturulan demokrasi endeksi (DI) bileşenlerine ait veriler ile PSI çok kriterli karar verme (ÇKKV) yöntemi ile ölçülmüştür. Araştırmada, PSI yöntemine göre ülkelerin demokrasi performansları Kanada, Almanya, İngiltere, Japonya, Fransa, İtalya ve ABD olarak sıralandığı gözlenmiştir. Bunun dışında, ülkelerin ortalama demokrasi performans değeri hesaplanmış ve söz konusu değerin altında performansa sahip olan ülkelerin İngiltere, Japonya, Fransa, İtalya ve ABD olduğu tespit edilmiştir. Buna göre, ortalama demokrasi performansından düşük performansa sahip olan ülkelerin küresel ekonomiye katkılarının daha fazla olması için demokrasi performanslarını artırmaları gerektiği değerlendirilmiştir. Ayrıca araştırmadaki duyarlılık, karşılaştırma ve simülasyon analizlerine göre, ülkelerin demokrasi performanslarının DI kapsamında PSI yöntemi kullanılarak ölçülebileceği sonucuna varılmıştır.

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INTRODUCTION

Democracy is a cornerstone of modern international relations and wields profound influence on a nation's political, economic, and social development. Consequently, the analysis of a country's democratic performance holds great significance on a global scale. Democratic systems encourage people to have a say in governance through their representatives, providing a framework for safeguarding fundamental human rights, delivering justice, and fortifying societal stability. In this context, the analysis of a country's democratic performance can be regarded as a critical tool for promoting values based on democracy, contributing to the development of a country's economy and other related dimensions (Ghardallou and Sridi, 2020, p. 2).

Particularly when we focus on major economies, the democratic performance of these countries plays a decisive role in the context of the world economy and international relations. The functioning of democratic institutions in major economies exerts significant influence on global trade, investment, diplomacy, and international cooperation. Therefore, the analysis of the democratic performance of major economies holds vital importance for the sustainability of global political and economic stability (Söderbaum, 2021, p. 4). In this regard, the research involves an analysis of the democratic performance of G7 countries using the Preference Selection Index (PSI) Multi-Criteria Decision Making (MCDM) method based on the component data of the democracy index (DI) created by The Economist Intelligence Unit (TEIU) for the year 2020, which is the most recent and up-to-date.

When the democracy literature is examined, democracy research on countries is generally based on the examination of democratic structures in those countries and the comparison of democratic structures between countries. However, according to the democracy literature, no research has been found that measures the democracy performance of countries using any MCDM method. Therefore, this research is unique in this respect and has contributed to both the democracy literature and the MCDM literature, enriching the literature. In addition, with this study, taking into account the relationship between democracy and economic dimensions, general conclusions can be drawn about which G7 country or countries should improve their democracy performance/performances in order to contribute more to the economy at the global level. In this context, the democracy performance of G7 countries, which are the largest economies in the world, was analyzed using the PSI method based on the relationship between democracy and economic dimensions. The research begins by explaining the literature on democracy and PSI. Secondly, the analysis and dataset of the research are outlined. The concluding section of the study provides insights and discussions drawn from the findings.

1. Literature Review

In the literature review, the subject of the research, democracy, was initially examined, and subsequently, the PSI literature was reviewed in terms of the research methodology.

The word democracy originates from Greek and is composed of the words demos (the community, a set of people, or full citizenship) and kratein (to rule or exercise power) (Schmidt, 2002, as cited in Demir, 2010, p. 599). When the literature is examined, it is possible to come across numerous definitions of democracy that are related yet distinct from one

another (Sartori, 2016, p. 8). Therefore, there is no universal definition of democracy (Öztürk, 2012, p. 95).

Democracy is generally defined as a governance system where the actions of rulers and elected representatives in the public domain are held accountable by citizens (Schmitter and Karl, 1991, p. 11). According to another definition, democracy is explained as the presence of an elected ruler or a ruler accountable to a parliament, universal and secret suffrage (Müller, 1998, p. 1). Olson (1993) has referred to democracy as the integration of competitive elections, social pluralism, and the absence of autocracy (p. 1).

Democracy should be considered not only in a political context but also in some economic and social dimensions. This is because democracy has functions or roles that affect and improve these economic and social dimensions. Therefore, democracy possesses the characteristic of being an independent variable in its relationships with other dimensions (Orviska, et al., 2014, p. 5). In this context, the relationships of democracy with other dimensions, according to the literature, are presented in Table 1.

Table 1. The Literature on the Relationships of Democracy with Other Dimensions

Related Dimensions	Literature
Democracy → Economic growth and development	Arezki and Gylfason (2011), Sharif et al., (2018), Knutsen (2012), Ghardallou and Sridi (2020)
Democracy → Perception of corruption	Rock (2009), Arezki and Gylfason (2011)
Democracy → Innovation	Campbell et al., (2015), Gao et al., (2017), Safari et al., (2018)
Democracy → Sustainable development	Sachikonye (2002), Pohoryles (2007), Zinchenko (2018), Wu (2021), Söderbaum (2021)

→: *Indicates a positive and significant causal structure*

Countries assess their potential for democracy in terms of its functionality in improving the dimensions described in Table 1. This is because countries compete with each other in terms of the development of the economy and other related issues. In this sense, countries can plan and implement activities to improve democracy by valuing their potential for democracy and addressing their shortcomings. Moreover, countries can collaborate with nations that have advanced democracy performance by examining each other's democratic capabilities. Therefore, the calculation of countries' democracy performance is of great importance. Consequently, countries need indices that determine their democracy performance (The Economist Intelligence Unit [TEIU], 2021).

Various metrics exist globally for assessing countries' democracy performance. The first one is the Democracy Index developed by the Netherlands Institute for Multiparty Democracy (NIMD). This index evaluates the democracy status of 16 countries through components such as dialogue, democracy education, women's participation in politics, youth and inclusivity, strengthening democracy infrastructure, and financial perspectives (Netherlands Institute for Multiparty Democracy, 2023). The second is the Democracy Index analyzed by the Institute for Democracy and Electoral Assistance (IDEA). This index assesses the democracy performance of 165 countries based on components like representative government, fundamental rights, government checks, impartial administration, and

participation (Institute for Democracy and Electoral Assistance, 2023). Lastly, the third is the Democracy Index (DI) created by The Economist Intelligence Unit (TEIU). This index comprises components such as the electoral process and pluralism, government functionality, political participation, political culture, and civil liberties. The index measured the democracy values of 167 countries for the latest year, 2020, on a scale from 1 to 10. Methodologically, the index determines countries' democracy performance through the arithmetic mean of its components (TEIU, 2021).

G7 countries represent the largest economies globally, holding sway over approximately 64% of global capital (Türker, 2018, p. 141). Therefore, when considering the relationship between democracy and economic growth, the activities of G7 countries in the realm of democracy can have an impact on the global economy and its associated dimensions, including employment, quality of life, trade, logistics, innovation, healthcare, and technical aspects. Moreover, changes in the democracy-related activities of G7 countries can lead to differentiation in the economic initiatives of other nations. Furthermore, according to the 2020 TEIU report, the average democracy performance value of countries was determined to be 5.44. From this average, Canada scores significantly higher at 69.8%, followed by Germany at 59.3%, the United Kingdom at 56.9%, Japan at 49.4%, France at 46.9%, the United States at 45.6%, and Italy at 42.2%. Additionally, the average democracy performance value of G7 countries surpasses the global average by 52.9%, making the democracy performances of G7 countries notably higher compared to many other nations. Therefore, the examination of G7 countries' democracy performance is deemed to be of significant importance (TEIU, 2021).

When examining the democracy literature, numerous studies regarding the quality and performance of countries' democratic structures are readily available. Rachdi and Saidi (2015) employed a generalized method of moments system approach to measure the relationships between democracy and economic growth variables of 17 MENA group countries in the period between 1983 and 2012 (p. 616–621). The study revealed that institutional autocracy score, executive recruitment, competitiveness, executive recruitment transparency, and executive constraints significantly constrained economic growth. Topal and Hayaloğlu (2017) conducted a panel data analysis (PDA) to investigate the relationships between institutional quality, environmental performance, and democracy dimensions' quantities of 124 countries from 2000 to 2014. Findings indicated that weak political risk in both developed and developing countries, strong governance quality, and democracy positively and significantly contributed to environmental performance (p. 189-212). Kılıç and Cin (2017, p. 1-10) examined the relationship between TEIUDI component data and income levels of countries for the period 2011-2013 using regression analysis. The study found a significant and negative relationship between TEIUDI components and income levels. Yorulmaz (2017) analyzed the relationship between health indicators, TEIUDI, and corruption perception index (CPI) for 126 countries in 2014 using structural equation modeling. The study revealed that TEIUDI had a negative and significant impact on CPI, while it positively and significantly affected health indicators from a democratic perspective (p. 191-205). Ahmed et al. (2021) determined the link between democracy, environmental regulations, economic growth, and ecological footprint dimensions of countries for the period 1985-2017 using PDA. The analysis indicated that the economic growth component increased ecological footprint

levels, while democracy and environmental regulations decreased ecological footprint levels, positively contributing to ecological sustainability. Additionally, according to the Granger causality test, democracy positively affected ecological footprint and renewable energy (p. 595–605). Barrett et al. (2021) conducted an analysis of the relationship between democracy and technology dimensions based on the literature. In this context, the study found that transparency, accountability, participation, informed society, social cohesion, and freedom of expression are common factors that facilitate a significant relationship between democracy and technology (p. 522–543). Cengiz and Manga (2021) examined the interaction between democracy and public debt dimensions in Turkey from 1975 to 2015 using ARDL and VECM Granger Causality Tests. The findings showed that moving away from democracy increased public debt. Furthermore, the study suggested that there was a unidirectional causal relationship between TEIUDI's square value and public spending to public debt in both the long and short term, whereas there was only a long-term unidirectional causality from economic growth to public debt (p. 113-134). Gorodnichenko and Roland (2021) analyzed the relationship between culture and democracy dimensions for 30 countries in the years 1960, 1980, and 2010 using PDA. The study found that in individualistic cultures, the relationship between culture and democracy dimensions was strong, while in collectivist cultures, this relationship was weaker (p. 165–195). Karacan et al. (2021) measured the relationship between governance style (TEIUDI), economic growth (gross domestic product and regime), and income inequality (GINI index) for 167 countries in 2021 using PDA. The study found that for North American countries, economic growth and income inequality dimensions had a positive relationship. In sub-Saharan African countries, this relationship was observed to be weaker (p. 1163-1193). TEIU (2021), measured the democracy performance of 165 countries for the year 2020. In this regard, the democracy performance values and ranking of G7 countries are presented in Table 2.

Table 2. DI Scores of Countries

Countries	Score	Ranking
Canada	9,238	1
France	7,996	5
Germany	8,674	2
Iyaly	7,734	7
Japan	8,13	4
United Kingdom	8,542	3
USA	7,926	6
Mean	8,32	

When examining Table 2, it can be observed that Canada has the highest democracy performance, while Italy has the lowest. Additionally, upon reviewing Table 7, it is determined that countries with democracy performance values exceeding the average are Canada, Germany, and the United Kingdom. Nazarov and Obydenkova (2021) analyzed the effects of democracy and life expectancy dimensions on countries based on data from 29 countries in Central Asia from 1990 to 2014. The study revealed that in the period from 1990 to 1995, life expectancy in countries was low, but especially after 1995, as countries transitioned to democracy, life expectancy increased. Thus, it was concluded that democracy can positively influence life expectancy over time (p. 261–285). Wang et al. (2021) used panel data analysis

(PVA) to establish the connection between democracy and innovation dimensions based on data variables from 132 countries spanning from 1980 to 2017. The findings indicate a significant and positive relationship between democracy variables and innovation variables in general. Furthermore, the research suggests that democracy, in particular, promotes innovation performance, while autocracy yields lower technological innovation performance (p. 1-15). Armutçu (2022) emphasized that the provision of democracy is an important factor in the formation of political stability. In this context, Armutçu (2022) determined the relationship between political stability and economic growth performance in BRICS-T countries between 1996–2020 using PDA method within the scope of the relationship between democracy and political stability. According to the findings, it was found that the effect of political stability, inflation and government spending on economic growth in BRICS-T countries is statistically significant and negative (p. 1917-1932). Muttakin et al. (2022) calculated the correlations between democracy, national culture, and carbon emissions components' data for 37 countries from 2006 to 2016 using Pearson correlation coefficients. The study yielded three key findings. Firstly, it was determined that there was a negative and significant relationship between democracy performance and greenhouse gas emission intensity. Secondly, the democracy dimension had a significant and negative relationship with greenhouse gas emission intensity, particularly in countries with individualistic cultures. Finally, it was observed that in countries with a strong culture of tolerance, the democracy dimension had a significant and positive relationship with greenhouse gas emission intensity. Accordingly, the study emphasizes the determinant role of national culture in the relationship between democracy performance and emission intensity (p. 2978-2991). Wagschal (2022) used regression analysis to determine the relationship between democracy and Covid-19 dimensions based on data from 41 countries. The findings suggest a positive and significant relationship between the number of Covid-19 deaths and democracy. Additionally, it was found that in the context of Covid-19, the governance structures of countries under the umbrella of democracy, as well as health-related variables such as corona incidence levels and healthcare systems, are significant factors in the increase in Covid-19 cases (p. 231–247). Balıkçıoğlu (2023), in the context of the relationship between democracy and economic, financial, institutional, and social risk, examined the effect of risks on economic growth using panel data analysis with relevant data from N11 countries between 1997-2021. According to the research findings, increases in economic, financial, and institutional risks increase the risks in economic growth; an increase in the social risk score, on the other hand, reduces the risk in economic growth (pp. 204-225). Karahan (2023) investigated the relationship between political stability and economic growth in Turkey and 14 MENA countries between 2002-2021 using PDA. The research results showed that there was no relationship between political stability and economic growth in the short term, but a relationship was found between the two variables in the long term (p. 1-84). Önder (2023) investigated the relationship between democracy and economic growth dimensions using PDA with relevant data from Turkey between 1973-2022. The study found that democracy has a positive and statistically significant effect on economic growth in Turkey in the long term. Based on this result, it is considered that more importance should be given to democratic values for economic development (p. 386-397). In the second part of the literature, research related to the PSI method is presented in Table 3.

Table 3. PSI Literature

Researcher(s)	Method(s)	Description
Sahir et al. (2018)	PSI	Analysis of laptop marketplace
Tuş and Adalı (2018)	PSI and CODAS	Evaluation of employees
Prasad et al. (2018)	PSI	Optimization of turning process parameters
Kabakcı and Bilgin-Sarı (2019)	PSI and TOPSIS	Analysis of bank performance
Akbulut (2020)	PSI and ARAS	Analysis of bank performance
Obeidat and Traini (2020)	PSI	Analysis of performance of water purification technologies
Puspitasari et al. (2020)	PSI	Analysis of decision support systems for work activity programs
Amin et al. (2021)	PSI	Selection of baby cream product
Jain et al. (2021)	PSI	Analysis of flexible manufacturing system performance
Luan and Phu (2021)	PSI	Optimization of flat-plate air solar collector
Tien et al. (2021)	PSI	Selection of SCM440 steel cylinder grinding process
Waruwu (2021)	PSI, WASPAS, and ROC	Comparison of teaching faculty performance
Budianto et al. (2022)	PSI	Optimum design of nonwoven fiber-reinforced epoxy composites
Bari and Karande (2022)	PSI	Selection of workshop scheduling
Verma et al. (2022)	PSI	Performance evaluation of glass ionomer and aluminum-silica nanoparticle-reinforced dental composites

2. Method

2.1. Analysis of the Research, Data Set, Significance and Limitation

In the research, the democracy performance of G7 countries was measured using the PSI method based on the most recent and up-to-date data for the year 2020, which includes the TEIUDI (DI) components of the countries. To facilitate the study, the abbreviated names of the DI components related to TEIUDI are explained in Table 4.

Table 4. Abbreviations for DI Components

Components	Abbreviations
Electoral Process and Pluralism	DI1
Government Functionality	DI2
Political Participation	DI3
Political Culture	DI4
Civil Liberties	DI5

TEIUDI, due to its capacity to measure the democracy performance of more countries compared to other democracy indices and its ability to provide a more detailed explanation of a country's democratic structure, is more frequently utilized in the literature for its component data. In this context, TEIUDI was employed in this study to measure the democracy performance of countries.

The PSI method is rooted in basic statistical science, and its greatest strength lies in not requiring criterion weights. Furthermore, it can be used when there are differences in thought regarding the determination of criterion weights (Demir et al., 2021, p. 152; Prasad et al., 2018, p. 140). In addition, the method is based on relatively simple operations in the calculation of decision alternatives' achievements and decision-making processes. Consequently, this method can be utilized by individuals who are not experts in solving multi-criteria decision-making problems (Stanujkic, et al., 2020, p. 178). In this regard, this study utilized the PSI MCDM technique due to the advantages mentioned for the method.

Upon reviewing the literature, no research that examines countries' democracy performance using MCDM was found. In this respect, it is believed that this research contributes to the democracy field in terms of its subject and to the MCDM literature in terms of its method. Therefore, with this study, it will be possible to evaluate which country or countries should contribute to the global economy.

As for the limitation of the study, only data for the year 2020 from the countries included in the study were used. It is considered that if democracy performance data for other years of the relevant countries were used in the study, the research would be more comprehensive and informative.

2.2. PSI Method

The PSI (Preference Selection Index) method was introduced to the MCDM literature by Maniya and Bhatt (2010, p. 1788). The PSI method has been employed by numerous researchers to address various decision-making problems such as material selection, flexible manufacturing system selection, human resource management, cutting fluid selection, sustainable mining, contractor selection, and determining laser cutting process conditions (Stanujkic et al., 2020, p. 177-178). In this regard, the application steps of this method are explained in the following points (Demir et al., 2021, p. 152-154; Maniya and Bhatt, 2010, p. 1790-1791; Stanujkic et al., 2020, p. 178-180).

Step 1: Formation of Decision Matrix

The decision matrix is established with m alternatives (rows) and n criteria (columns), creating an mxn level of consistency equal to 1.

$$X=[x_{ij}]_{mxn} \begin{bmatrix} x_{11} & x_{12} & x_{1n} \\ x_{21} & x_{22} & x_{2n} \\ \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & x_{mn} \end{bmatrix} \tag{1}$$

(1)

In the matrix, x_{ij} represents the value of the i-th alternative for the j-th criterion.

Step 2: Calculation of Normalized Values of the Decision Matrix

For Benefit (Maximization) Direction Criteria:

$$n_{ij}=\frac{x_{ij}}{maksx_{ij}} \tag{2}$$

For Cost (Minimization) Direction Criteria:

$$n_{ij}=\frac{minx_{ij}}{x_{ij}} \tag{3}$$

Step 3: Calculating the Preference Variance Value (PV_j)

$$\overline{x_{ij}^{*}} = \frac{1}{m}\sum_{i=1}^{m} x_{ij}^{*} \tag{4}$$

$$PV_j=\sum_{i=1}^{m} \left(x_{ij}^{*}-\overline{x_{ij}^{*}}\right)^2 \tag{5}$$

Step 4: Determining the General Preference Value (Ψ_j)

To calculate the Ψ_j value, it is necessary to measure the deviation in the preference value with (Φ_j) as shown in Equation 6.

$$\Phi_j = 1 - PV_j \tag{6}$$

Then, the (Ψ_j) value is measured according to Equation 7.

$$\Psi_j=\frac{\Phi_j}{\sum_{j=1}^{n} \Phi_j} \tag{7}$$

$$\sum_{j=1}^{n} \Psi_j=1 \tag{8}$$

Step 5: Measuring the Preference Index (I_i)

$$I_i = \sum_{j=1}^{n} x_{ij}^{*}. \Psi_j \tag{9}$$

3. Findings
3.1. Computational Analyses

In the study, firstly, a decision matrix was constructed with Equation 1 using the PSI method, and since all components were positively oriented, the normalized values were calculated with Equation 2. The relevant values are presented in Table 5.

Table 5. Decision and Normalized Decision Matrix

Decision Matrix					
Countries/Components	**DI1**	**DI2**	**DI3**	**DI4**	**DI5**
Canada	9,58	8,93	8,89	9,38	9,41
France	9,58	7,5	7,78	6,88	8,24
Germany	9,58	8,21	8,33	8,13	9,12
Italy	9,58	6,43	7,22	7,5	7,94
Japan	8,75	8,57	6,67	8,13	8,53
Maximum	10	8,93	8,89	9,38	9,41
United Kingdom	10	7,5	8,89	7,5	8,82

Table 5 (Continued). Decision and Normalized Decision Matrix

Decision Matrix					
Countries/Components	**DI1**	**DI2**	**DI3**	**DI4**	**DI5**
Maximum	10	8,93	8,89	9,38	9,41
Normalized Decision Matrix					
Countries/Components	**DI1**	**DI2**	**DI3**	**DI4**	**DI5**
Canada	0,958	1	1	1	1
France	0,958	0,8399	0,8751	0,7335	0,8757
Germany	0,958	0,9194	0,937	0,8667	0,9692
Italy	0,958	0,72	0,8121	0,7996	0,8438
Japan	0,875	0,9597	0,7503	0,8667	0,9065
United Kingdom	1	0,8399	1	0,7996	0,9373
USA	0,917	0,7604	1	0,6663	0,9065

In the third step of the method, initially, the average of the normalized values of decision alternatives was measured using equation 4, denoted as $(\bar{x}_j^*)$. Subsequently, with the aid of equation 5, the preference variance value (PV_j) for these decision alternatives was determined. In this context, the measured values are presented in Table 6.

Table 6. Average of Decision Alternatives $(\bar{x}_j^*)$ and (PV_j) Values

Countries	$\bar{x}_J^*$	PV_j
Canada	0.9916	0.0014
France	0.8564	0.0264
Germany	0.9301	0.0065
Italy	0.8267	0.0299
Japan	0.8716	0.0237
United Kingdom	0.9153	0.0339
USA	0.85	0.072

In the fourth step of the PSI method, deviations in the preference values of decision alternatives (Φ_j) and the overall preference values (Ψ_j) were determined. Finally, in the fifth step, the preference index values of the decision alternatives (democracy performance values of the countries) were measured and are presented in Table 7.

Table 7. Preference Index Values of Decision Alternatives (Democracy Performance Values of Countries)

Countries	Φ_j	Ψ_j	Preference Index (Performance)	
			Score	Ranking
Canada	0,9986	0,1469	0,7274	1
France	0,9736	0,1432	0,6125	5
Germany	0,9935	0,1462	0,6788	2
Italy	0,9701	0,1427	0,5891	6
Japan	0,9763	0,1436	0,6251	4
United Kingdom	0,906	0,1419	0,6297	3
USA	0,928	0,1365	0,5795	7
Total	6,7966	1	-----	-----
Mean			**0,6346**	-----

According to Table 7, countries' democracy performance values are ranked as follows: Canada, Germany, United Kingdom, Japan, France, Italy, and the United States. Furthermore, when Table 7 is examined, it is evident that Canada and Germany stand out from the other countries in terms of their high democracy performance. Additionally, it has been determined that the only countries with democracy performance values exceeding the average are Canada and Germany.

3.2. Sensitivity Anaysis

In the research, a methodology-based sensitivity analysis was carried out for the PSI approach. Within the framework of MCDA, sensitivity analysis can be accomplished by contrasting the outcomes and hierarchies resulting from the application of various MCDM methods to identical datasets (Gigovič, 2016, p. 24).

In this context, many studies have measured the democracy performance of countries using the TOPSIS, PIV, and OCRA methods, which are commonly used to determine the performance of decision alternatives or in selection problems. The relevant values and rankings identified as a result of the measurement are presented in Table 8.

Table 8. Democracy Performance Values and Rankings of Countries According to MCDA Methods

| Countries	DI		PSI		TOPSIS		PIV		OCRA	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Canada	9,238	1	0,7284	1	0,923	1	0,0168	1	1,136	1
France	7,996	5	0,6134	5	0,3757	6	0,3123	5	0,1912	5
Germany	8,674	2	0,6798	2	0,6868	2	0,1519	2	0,7014	2
Italy	7,734	7	0,59	6	0,3003	7	0,3735	7	0	7
Japan	8,13	4	0,626	3	0,503	3	0,2708	4	0,335	4
United Kingdom	8,278	3	0,6244	4	0,4996	4	0,2466	3	0,4061	3
USA	7,926	6	0,5803	7	0,3867	5	0,3296	6	0,1382	6

When Table 7 is examined, it is observed that the ranking of the PSI method differs from the DI and TOPSIS methods but is consistent with the PIV and OCRA methods. Therefore, it can be considered that the PSI method is particularly sensitive to the

measurement of countries' democracy performance within the scope of DI component data, leading to differing rankings when compared to the DI and TOPSIS methods.

3.3. Comperative Analysis

The comparative examination evaluates the associations and standings of the suggested approach in contrast to alternative techniques for calculating the other methods. In this perspective, the suggested method is anticipated to exhibit credibility and dependability, to demonstrate minimal deviations from other methodologies, and to exhibit a constructive and substantial correlation with various weight coefficient approaches (Keshavarz-Ghorabaee, et al., 2021, p. 19). The arrangements of these methodologies are visually represented in Figures, utilizing the data presented in Table 8. Beforehand, the DI values were standardized to fall within the [0,1] range, akin to the standardization process applied to other methods.

Figure 1. Discriminant Visual
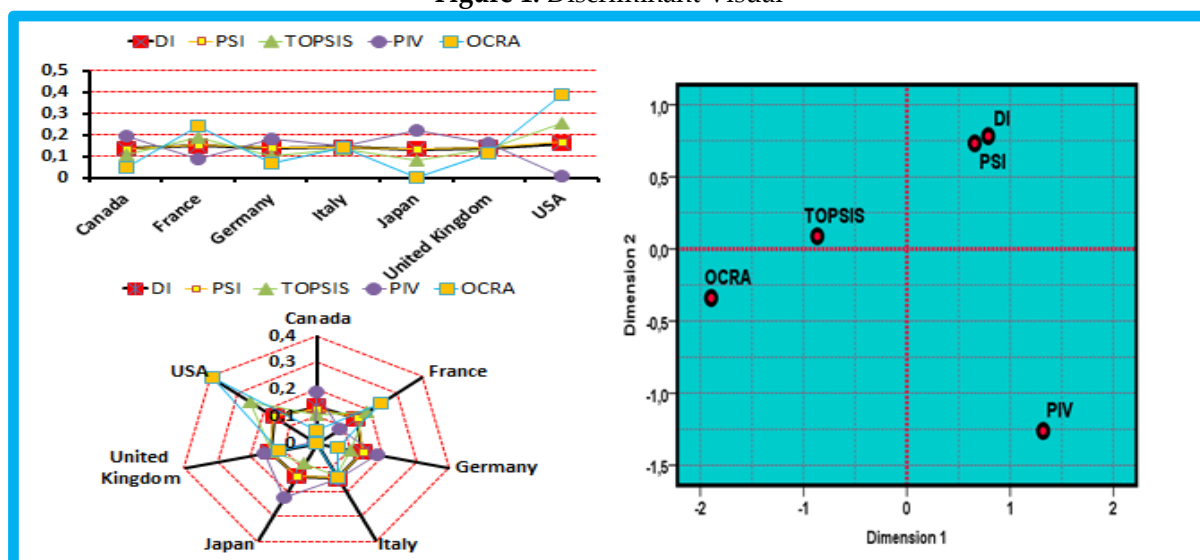
When examining Figure 1, it is observed that the DI method is more compatible with other methods except for the PIV method. In this regard, it is considered that the DI method has significant positive relationships with other methods, excluding the PIV method. The correlation values of the PSI method with other methods are shown in Table 9.

Table 9. Correlation Values of the PSI Method with Other Methods

Methods	DI	TOPSIS	PIV	OCRA
PSI	0,979**	0,975**	-0,981**	0,981**

*p**<.01*

When Table 9 is examined, it is observed that the PSI method has a significant, strong, and positive relationship with the DI method, and a significant, strong, and negative relationship with the PIV method. Based on these findings, it is considered that the PSI method is credible and reliable, as it has significant and positive relationships with the DI, TOPSIS, and OCRA methods.

3.4. Simulation Analysis

To ensure the resilience of our simulation analysis, we have generated various scenarios by allocating distinct values to our decision matrices. In the quest to evaluate the consistency of outcomes produced through the implementation of our proposed methodology, we anticipate observing discernible deviations between our approach and alternative methods as the number of scenarios expands. In the second case, it is essential that the mean variance of our proposed method across these scenarios surpasses the average variance of one or more of the other methods. This differential highlights the relative effectiveness of our proposed method in distinguishing among decision alternatives. Ultimately, we expect the variances of criterion weights obtained through different methodologies within each scenario to exhibit homogeneity (Keshavarz-Ghorabaee, et al., 2021, p. 19-20).

Within the scope of the simulation analysis, we computed correlation coefficients between the PSI method and other methodologies. These calculations were grounded on the initial creation of 10 distinct scenarios, and the corresponding results have been presented in Table 10.
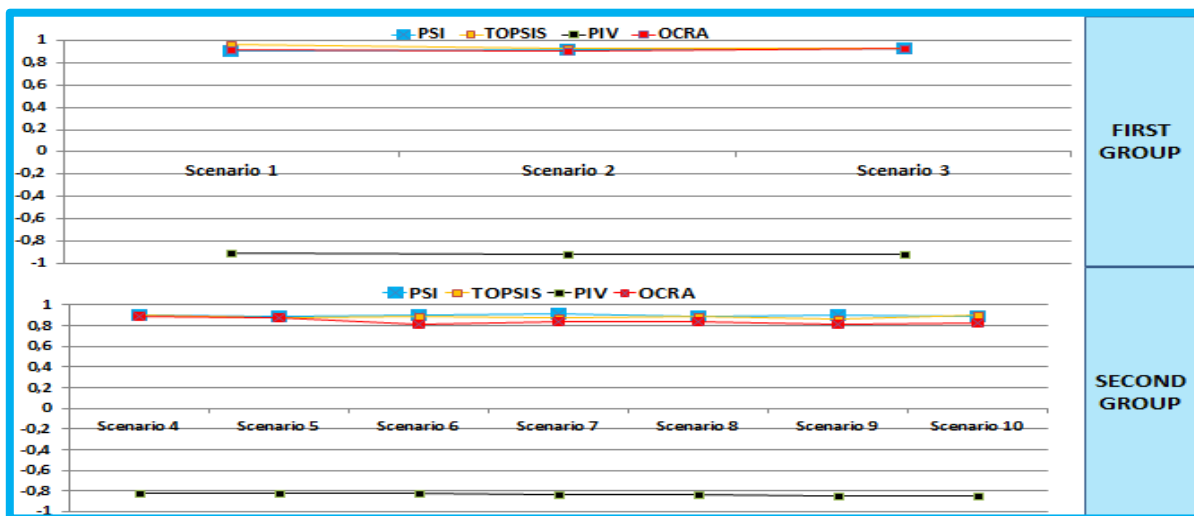
Table 10. Correlation Coefficients Representing the Associations between the PSI Method and Alternative Approaches within Individual Scenarios

Methods		DI	TOPSIS	PIV	OCRA
Scenario 1	FIRST GROUP	0,905**	0,885**	-0,805**	0,810**
Scenario 2		0,915**	0,875**	-0,810**	0,900*
Scenario 3		0,895**	0,890**	-0,815**	0,920**
Scenario 4		0,900**	0,900**	-0,820**	0,895**
Scenario 5	SECOND GROUP	0,895**	0,880**	-0,825**	0,880**
Scenario 6		0,905**	0,890**	-0,830**	0,820**
Scenario 7		0,910**	0,875**	-0,835**	0,835**
Scenario 8		0,895**	0,895**	-0,840**	0,840**
Scenario 9		0,905**	0,870**	-0,845**	0,810**
Scenario 10		0,895**	0,900**	-0,850**	0,825**

$p**<.01, p*<.05$

When Table 10 is examined, it is observed that as the scenarios increase, the relationships between the PSI method and other methods decrease, and accordingly, the characteristic quality of the PSI method increases. In all scenarios, the PSI method establishes significant, positive, and strong relationships with the TOPSIS and OCRA methods. However, it establishes significant, negative, and strong relationships with the PIV method. Additionally, in Table 10, the correlation quantities of the PSI method within the specified scenarios are divided into two sections, and a comparison between these sections is created as shown in Figure 2.

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Figure 2. Comparison of Methods with Each Other

When Figure 2 is examined, it is observed that as the scenarios increase, the correlation values of the PSI method with other methods decrease, and the distinguishing characteristics of the methods increase. Additionally, the spatial distribution of the methods belonging to the first and second groups, based on the correlation quantities of the PSI method with other methods as shown in Figure 3.

Figure 3. A Discriminant Plot of the Correlations between the PSI Method and Other Methods Across Scenarios
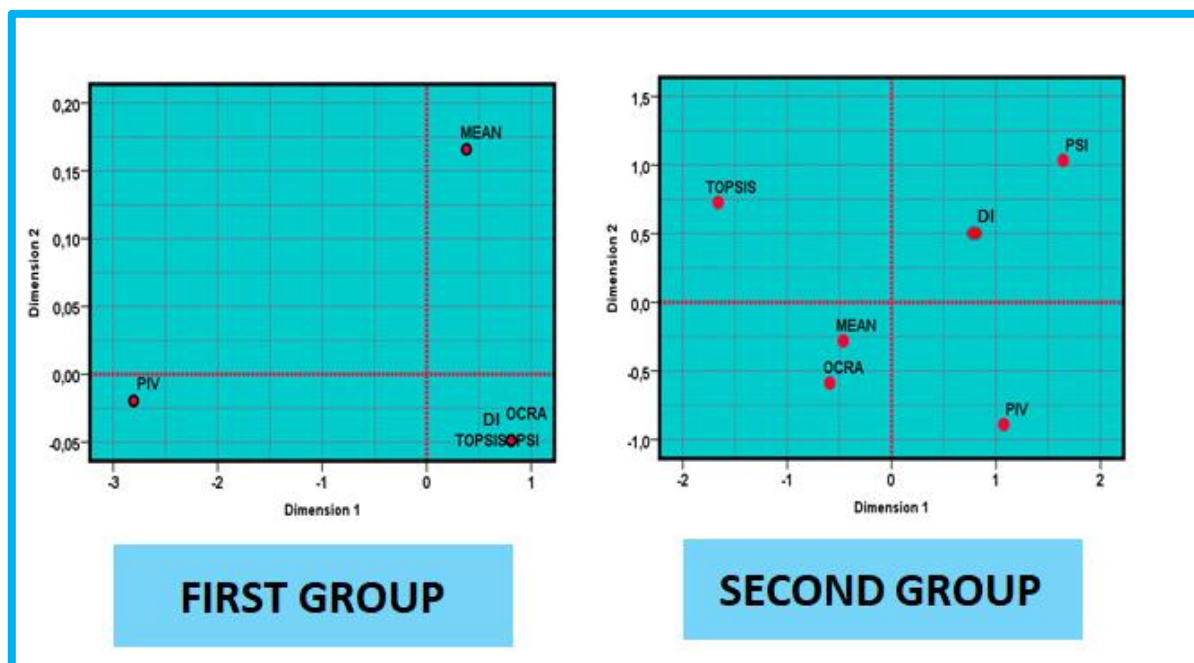

Figure 3 illustrates that the methods in the initial category tend to be in close proximity to each other in the first three scenarios. However, a distinct pattern of divergence becomes evident in the subsequent seven scenarios, leading to an increasing separation between the methods. This observation implies that the unique characteristics of these methods become

more prominent with the progression of scenarios, resulting in a higher level of differentiation among the methodologies.

Within the simulation analysis, the variance measurements for the methods were computed in each scenario, and the outcomes are detailed in Table 11.

Table 11. Variance Values of Methods Across Scenarios

Scenario	PSI	DI	TOPSIS	PIV	OCRA
1. Scenario	0,002375	0,001976	0,002123	0,002325	0,002144
2. Scenario	0,002689	0,002045	0,002265	0,002084	0,002299
3. Scenario	0,002234	0,002109	0,002190	0,002164	0,002188
4. Scenario	0,002821	0,002322	0,002316	0,002287	0,002248
5. Scenario	0,002478	0,002164	0,002265	0,002200	0,002265
6. Scenario	0,002589	0,002277	0,002211	0,002373	0,002215
7. Scenario	0,002367	0,001943	0,002164	0,002135	0,002179
8. Scenario	0,002743	0,002277	0,002237	0,002286	0,002231
9. Scenario	0,002456	0,002044	0,002289	0,002213	0,002260
10. Scenario	0,002698	0,002312	0,002177	0,002349	0,002263
Mean	0,002545	0,002147	0,002224	0,002241	0,002229

According to Table 11, it is observed that the variance value of the PSI method is higher than the variance values of the other methods. Therefore, the PSI method is considered to be more effective in distinguishing decision alternatives (countries) from each other compared to the other methods.

In the continuation of the simulation analysis, the homogeneity of variances in methods obtained through the PSI method was assessed using the ADM (Analysis of Means for Variances with Levene) test across various scenarios. This analysis offers a visual tool for validating variance homogeneity. The graphical representation comprises three key variables: the overall average ADM, the upper decision limit (UDL), and the lower decision limit (LDL). If the standard deviation within a group (cluster) extends beyond the decision limits, it signifies a significant deviation from the overall average ADM, indicating variance heterogeneity. In essence, when the standard deviations of all clusters fall between the LDL and UDL, it confirms the homogeneity of variances (Keshavarz-Ghorabaee et al., 2021, p. 15). The graphical depiction of the ADM analysis can be observed in Figure 4.

Figure 4. ADM Analysis
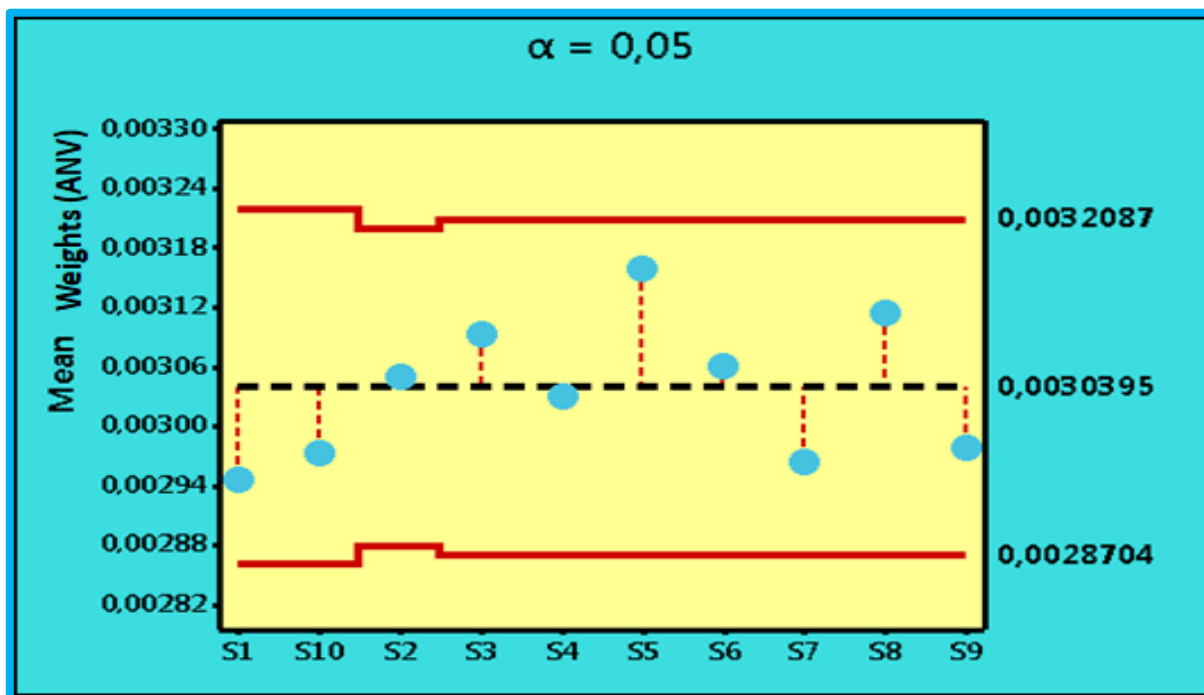
As illustrated in Figure 4, the ADM values calculated for each scenario are situated below the UDL thresholds and above the LDL thresholds. Consequently, the variances pertaining to the weights determined in each scenario exhibit homogeneity. This condition was also assessed using the Levene Test, with the fundamental statistics for the Levene Test being outlined in Table 12.

Table 12. Levene Statistic

Levene Statistic	df1	df2	Sig.
0,340	2	10	0,115

*p**<.05*

Based on the data presented in Table 12, the p-value (p=0.115) surpasses the significance threshold of 0.05, indicating that the variances in criterion weights across scenarios demonstrate homogeneity. In a more comprehensive context, the collective outcomes of the simulation analysis affirm the robustness and stability of the PSI method.

CONCLUSION AND DISCUSSION

The development of democracy can contribute to the economic development of countries. Especially for countries with large economies, the activities it provides for the advancement of democracy can enhance the global economy and its related components. In this context, it can be considered important to determine the democracy performance of countries with significant economies. In this study, firstly, the democracy performance of G7 countries, which constitute the majority of global capital, has been calculated using the PSI MCDM technique with the numerical values of DI components for the most recent year, 2020.

In the study, first of all, the democracy performance of these countries has been ranked as Canada, Germany, the United Kingdom, Japan, France, Italy, and the USA. In addition, it

has been determined that Canada and Germany stand out from other countries in terms of their higher democracy performance. Furthermore, the average democracy performance value of countries has been calculated, and it has been established that the countries with performance above this value are Canada and Germany.

In the research, in terms of the method, firstly, sensitivity analysis has been provided for the measurement of democracy performance of countries using the PSI method based on DI data. For this purpose, the democracy performance of countries has been measured with other Multiple-Criteria Decision-Making (MCDM) methods (TOPSIS, PIV, and OCRA), and the rankings of these performance values have been compared. According to the findings, it has been observed that the rankings of the PSI method are different from the rankings of other methods used to measure the democracy performance of countries. Thus, based on this result, it has been concluded that the DI data of countries are sensitive to the PSI method in measuring democracy performance. From a methodological point of view, secondly, the relationships between the findings obtained by the PSI method and the findings obtained by other methods have been compared, and relationships between these methods have been identified. In this context, it has been particularly determined that the PSI method has positive relationships with the DI, TOPSIS, and OCRA methods, while it has a negative relationship with the PIV method. Therefore, based on this result, it has been considered that the PSI method is reliable and credible, especially due to its positive and high relationships with the DI, TOPSIS, and OCRA methods. Lastly, from a methodological perspective, using simulation analysis, a total of 10 scenarios (10 decision matrices) have been created, each consisting of different values for countries, and correlation values between the PSI method and other methods have been calculated based on these created decision matrices. The scenarios have been classified into the first three scenarios as the first group and the next seven scenarios as the second group. According to the findings, as the scenarios increase, it has been determined that the correlation quantity between the PSI method and other methods decreases, and accordingly, the PSI method diverges from the methods. Secondly, within the created scenarios, variance values of PSI and other methods have been measured, and it has been observed that PSI has the highest variance value. Thus, it has been concluded that the PSI method is more effective in distinguishing decision alternatives from each other compared to other methods. Furthermore, in the simulation analysis, scenarios and the Analysis of Means for Variances with Levene (ADM) test have been provided for the PSI method. According to the findings, the SDM values of the PSI method are within the upper and lower limits in all scenarios and close to the average ADM value. Therefore, it has been observed that the PSI method is robust and stable. As a result, in terms of sensitivity, comparative, and simulation analysis, it has been concluded that countries' democracy performance can be measured based on DI data.

In the literature, the rankings of the democracy performance of the G7 countries for the year 2020 in TEIU (2021) and this study have been fully consistent for Canada, Germany, the United Kingdom, Japan, and France. Moreover, in this study, it was determined that Canada and Germany have higher democracy performance compared to other G7 countries, while in the TEIU (2021) study, it was found that Canada, Germany, and the United Kingdom have higher democracy performance. Therefore, it can be considered that Canada and Germany have higher democracy performance compared to other G7 countries.

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For countries with democracy performance below the average democracy performance value, such as France, the United Kingdom, Japan, Italy, Canada, and the USA, it may be beneficial for them to implement strategies and activities to enhance their democracy performance, which can contribute to the global economy and other related components. In future studies, democracy performance measurements can be extended to countries that are members of supranational and international organizations for the purpose of providing economic and commercial benefits, not only for G7 countries. In addition, in terms of the method, the number of democracy components can be increased for a more comprehensive and objective measurement of democracy performance according to the conditions of each country. From a methodological perspective, the democracy performance of countries can be measured using the PSI method and other MCDM methods beyond the mentioned other CCCV methods (EDAS, WASPAS, COPRAS, CODAS, MAIRCA, MARCOS, COCOSO, MULTIMOORA, MOOSRA, MABAC, VIKOR), and rankings of these methods can be compared.

Table 13. Definitions and Abbreviations

Definitions	Abbreviations
Democracy Index	**DI**
Democracy Index analyzed by the Institute for Democracy and Electoral Assistance	**IDEA**
Multi-Criteria Decision Making	**MCDM**
Netherlands Institute for Multiparty Democracy	**NIMD**
Operational Competitiveness Ratings Analysis	**OCRA**
Panel Data Analysis	**PDA**
Preference Selection Index	**PSI**
Proximity Indexed Value	**PIV**
Technique for Order of Preference by Similarity to Ideal Solution	**TOPSIS**
The Economist Intelligence Unit	**TEIU**
The Economist Intelligence Unit Democracy Index	**TEIUDI**

Research and Publication Ethics Statement

In this study, we declare that we have obtained the data, information, and documents presented in it in accordance with academic and ethical standards. We have adhered to all scientific ethical and moral rules in presenting all information, documents, evaluations, and results. We have appropriately cited all the works used in the study, and we have not made any changes to the data used. We affirm that the study is original. In case of any contrary situation, we acknowledge that we accept all potential rights losses that may arise.

Author Contributions to the Article

The article has been prepared by the sole author.

Ethics Committee Approval

In this article, ethics committee approval is not required. A signed consent form stating that ethics committee approval is not necessary is included in the article processing files on the system.

Declaration of Interests

There are no conflicts of interest among the authors.

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