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MEASURING DEFENSE PERFORMANCE: AN INTERNATIONAL COMPARISON WITH THE MULTIMOORA METHOD

Abstract. *Nowadays, when the conflicts and crises on the Russia-Ukraine line continue, many countries condemn Russia and take various military and economic measures against Russia. This negative picture reveals the importance of the defense system that aims to provide security and resist possible attacks on countries. The country's defense systems can be shaped by different dynamics depending on the countries' experiences in the historical process, their national incomes, the policies they follow, and their geopolitical situations. This study aims to effectively evaluate the defense performances of the actors that may be a party in the Russia-Ukraine war. For this purpose, the 2020 data of the countries in the categories such as military, economic, demographic, innovation, and negative peace are used in the MULTIMOORA method. The results show that countries such as America, Russia, and the United Kingdom are at the top of the performance rankings, and North Macedonia, Montenegro, and Latvia are at the bottom of the performance rankings.*

Keywords*: Defense Performance, Russia, Ukraine, MULTIMOORA, Improved Borda Rule*

JEL Classification: C02, C44, H56

1. Introduction

The beginning of Russia's tragic attempt to invade Ukraine is based on the social and political tensions within Ukraine. The protests that started in Kyiv in 2013 and described as the peaceful protest of ordinary citizens dragged Ukraine to the brink of a severe crisis (Onuch and Sasse, 2016, p. 556). A temporary government was formed due to the instability in the country, and Russia, perceiving this change of government in Ukraine as a risk, made military interventions based in Crimea and Donbas. These developments that resulted in the deterioration of Ukraine's territorial integrity have changed the dynamics within and beyond Ukraine's borders. The European Union (EU) and the United States of America (USA) have taken various military and economic measures against Russia by supporting Ukraine. Furthermore, while the EU member states directed their actions through the union, they acted through NATO (Scazzieri, 2017, p. 393).

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As a result of Russia's invasion of Ukraine in 2022, unions such as the Council of Europe, the European Commission, NATO, and the heads of state of countries such as the USA, England, and Canada made various press statements stating that the occupation was a severe violation of international law, and that Russia stopped its military actions. With the Russia-Ukraine war, the first interstate war of the 21st century, the importance of military power has emerged to protect the country's security and resist possible attacks. Considering this situation and the present information age, military strength is directly related to scientific and technological developments. Besides, these developments affect the defense expenditures of countries.

Numerous studies have been conducted in the literature examining the impact of defense expenditures on the economy (Kollias et al. 2004). These studies evaluated the substantial effects of defense expenditures from demand, supply, and security channels. The demand, supply, and security channels deal with the countries' defense expenditures in terms of production factors, technology, investment, and incentives and explain the impact of these expenditures on economic growth and development (Dunne et al., 2005, pp. 450-451). Long-term trends in defense expenditures and sharp reversals of these trends have been accepted as signs of changes that may occur in defense outputs (Sköns et al., 1999, p. 327). This acceptance shows that the rise or fall of defense expenditures is due to the differences in the level of threat faced by countries. For example, according to the SIPRI military expenditure database, Russia increased the share of its military expenditures in GDP from 3.43% to 5.43% from 2011 to 2016. However, it is known that Russia's military expenditures decreased in the following years as a result of Russia's annexation of Crimea in 2014 and as a result of sanctions.

As the conflicts on the Russia-Ukraine line continue, this paper intends to fill the evaluation of the defense performance of the countries that may be a party to the war, especially Russia and Ukraine, which is crucial in ensuring their security and resisting possible attacks. The contribution of the study to the literature is that an effective multi-criteria decision making (MCDM) method can be applied to analyse the countries' defense performances considering wide range of criteria. In this context, the performance of the countries is analysed by using the data from 18 variables in the military, economic, demographic, innovation, and negative peace categories for 2020 in the MULTIMOORA method. The MULTIMOORA method has advantages in producing a more robust final ranking with three different sub-approaches, namely the ratio approach, the reference point approach, and the full multiplicative approach, and it uses vector normalisation, which is considered a solid choice when creating comparable evaluations.

The rest of the paper is structured as follows: Section 2 gives an overview of the literature on defense performance. Section 3 represents the MULTIMOORA method and the improved Borda rule. Section 4 introduces the data, descriptive statistics, application, and research findings. The final section discusses the closing remarks for the use of the MCDM method in measuring the defense performance of countries.

2. Literature review

Due to Russia's invasion of Ukraine on February 24, 2022, Russia and Ukraine are seen as the central actors, but the parties are involved, and the war is changing the dynamics in the region and beyond. Tragic events reveal the importance of military capacity and reserves to ensure national security. To ensure the security of countries or in the event of a possible war, "defense" emerges as a concept that always attracts attention with all its dynamics and parameters.

The lack of a firm and definite consensus in the literature on the economic effects of defense expenditures has been the subject of empirical studies. In this context, Kollias et al. (2004) examined the economic impacts of defense expenditures for the period 1961-2000 by using causality tests in the example of EU member states. They argued that although there is no uniformity specific to countries, the causality is from growth to defense expenditures and that this situation stems from the countries' policy decisions.

Åtland (2016) evaluated the security situation in Northern Europe specifically in NATO and Russia, whose relations deteriorated due to the Russia-Ukraine 2014 crisis. Considering the potential that can be learned from Russia's intervention in Ukraine, it discussed the measures that should be taken by the NATO and the Northern European members and partner countries, especially Norway, Sweden, and Finland, to maintain regional stability in terms of security. Schilde (2017) evaluated the crisis in 2014 through the lens of the military power and capabilities of the EU. It is stated that the crisis is a critical juncture in the EU power dynamics and that the member states of the union should develop their military strategies and capabilities in defense and security issues to counter possible wars through the cyber defense and public diplomacy or to have a deterrent effect.

Weapon selection plays an important role in the design of an effective defense system. Dağdeviren et al. (2009) developed an evaluation model based on MCDM for the weapon selection problem which affects the overall performance and productivity of a defense industries. A real weapon selection application is conducted to show that the model composed of AHP and fuzzy TOPSIS has significantly enhanced the efficiency of the decision-making process. Ashari and Parsaei (2014) utilised the ELECTRE III technique, which is capable of considering the fuzzy nature and multi-dimensional construction of decision making, for the optimal weapon selection of armed forces.

Kofroň and Stauber (2021) quantitatively analyzed the changes in the defense expenditures of European countries after the Russia-Ukraine conflict in 2014. The results indicated that most European countries reduced their defense spending, and NATO or EU member states behaved similarly to non-members. Ozili (2022) researched the global economic consequences of the Russia-Ukraine war in February 2022. It is stated that the international sanctions against Russia had a negative impact on the global economy through the global supply chain, causing an increase in food, energy, and fuel prices, thus causing an increase in global inflation.

The literature review on the economic effects of the countries' defense expenditures or the Russia-Ukraine war shows that the conception of defense in peace or war is crucial for countries. However, there are very few studies in which the countries' defense performance is subjected to a comprehensive evaluation or is measured in terms of the actors that may be a party to the war. To overcome this problem, the study aims to evaluate the countries' defense performances with an analytical method and to rank them as a result of the evaluation.

3. Methodology

The MOORA (**M**ulti **O**bjective **O**ptimisation by **R**atio **A**nalysis) method was first proposed in 2006 by Brauers and Zavadskas. The MULTIMOORA method has been developed as a result of adding the fully multiplicative approach to the MOORA method that consists of the ratio approach and reference point approach. The rankings obtained by the three sub-approaches are combined with a ranking aggregation tool, and a single MULTIMOORA ranking can be obtained. The structure of the method is presented in Figure 1 (Brauers and Zavadskas, 2011, p. 176):

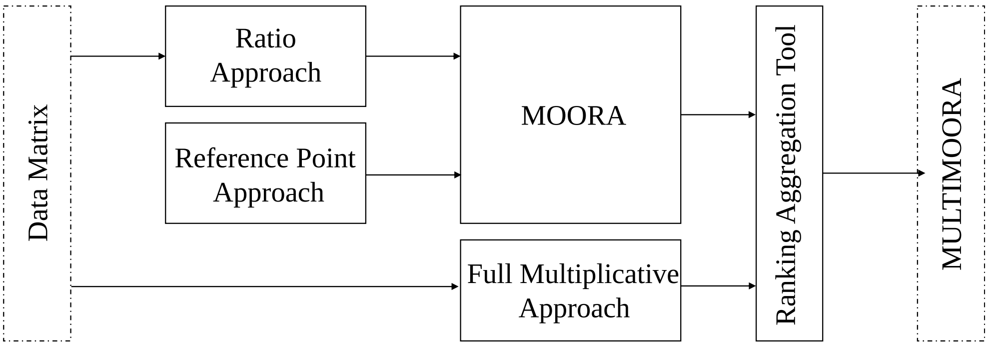

Figure 1. Structure of the MULTIMOORA

3.1. Ratio Approach

Since the ratio approach uses an arithmetic weighted addition operator, it is an effective tool for problems with independent objectives (Hafezalkotob et al., 2019). The theoretical steps of the approach are given below (Brauers and Zavadskas, 2013; Baležentis et al. 2012):

The first implementation step of the approach is to define the decision matrix, X, which consist of x_{ij} $(i = 1, 2, \dots, m$ ve $j = 1, 2, \dots, n)$ expressing the value of alternative i. on objective j., and W weight matrix. In this data matrix, m is the number of alternatives and n is the number of goals.

$$X = \begin{array}{c} \\ \end{array} \begin{matrix} c_1 & \cdots & c_j & \cdots & c_n \end{matrix}$$

$$X = \begin{bmatrix} x_{11} & \cdots & x_{1j} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots & \ddots & \vdots \\ x_{i1} & \cdots & x_{ij} & \cdots & x_{in} \\ \vdots & \ddots & \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mj} & \cdots & x_{mn} \end{bmatrix} \begin{matrix} A_1 \\ \vdots \\ A_i \\ \vdots \\ A_m \end{matrix} \tag{1}$$

$$W = [\, w_1 \;\; \cdots \;\; w_j \;\; \cdots \;\; w_n]$$

The value of each alternative for each objective is normalised using equation (2). x_{ij}^* in this equation named as vector normalisation and refers to the normalised values of x_{ij}. These values are generally in the range of [0, 1].

$$x_{ij}^* = x_{ij} \Big/ \sqrt{\textstyle\sum_{i=1}^{m} \left(x_{ij}\right)^2} \tag{2}$$

If the desired value of the objectives is maximum, the objectives are added. On the contrary, if the desired value of the objectives is minimum, the objectives are subtracted. The summarising index for each alternative is calculated using equation (3). In the summarising index, the sum of the minimisation values is subtracted from the sum of the maximisation values. Besides, $g = 1, \ldots, n$ is the number of objectives to be maximised and $(n - g)$ is the number of objectives to be minimised.

$$y_i = \textstyle\sum_{j=1}^{g} w_j x_{ij}^* - \sum_{j=g+1}^{n} w_j x_{ij}^* \tag{3}$$

The ratio approach values of the alternatives are listed in descending order as in equation (4). The alternative with the highest y_i value represents the best alternative.

$$r(y_i) = \left\{ A_{i|\underset{i}{\text{maks}}\, y_i} \succ \cdots \succ A_{i|\underset{i}{\min}\, y_i} \right\} \tag{4}$$

3.2. Reference point approach

The reference point approach is based on the ratio approach. This approach uses the normalised values obtained in equation (2). The coordinate j of the reference point, namely r_j, is explained as the largest value of the alternatives in maximisation cases and the smallest value in minimisation cases. After this selection, the deviation of each element of the normalised matrix from the reference point is calculated using Tchebycheff's $\min - \max$ metric (Brauers and Zavadskas, 2013; Baležentis et al., 2012):

$$z_i = \min_i \left\{ \underset{j}{\text{maks}} \left| w_j r_j - w_j x_{ij}^* \right| \right\} \tag{5}$$

This approach finds alternative ratings with the worst performance for each objective and finally selects the overall best value (i.e., minimum value) from these worst ratings. The reference point approach values of the alternatives are listed in ascending order as in equation (6). The alternative with the smallest z_i value represents the best alternative.

$$r(z_i) = \left\{ A_{i|\underset{i}{\min}\, z_i} \succ \cdots \succ A_{i|\underset{i}{\text{maks}}\, y_i} \right\} \tag{6}$$

3.3. Full multiplicative approach

The MULTIMOORA method has been brought to the literature by adding the full multiplicative approach to the MOORA method. The full multiplicative approach refers to a dimensionless number obtained as a result of the multiplication of different units of measure. In this approach using the geometric weighted addition operator, the overall utility of the alternative i are calculated as in equation (7), where $g = 1, \dots, n$ is the number of objectives to be maximised and $(n - g)$ is the number of objectives to be minimised (Brauers and Zavadskas, 2013).

$$u_i = \prod_{j=1}^{g} (x_{ij})^{w_j} / \prod_{j=g+1}^{n} (x_{ij})^{w_j} \tag{7}$$

The full multiplicative approach values of the alternatives are listed in descending order as in equation (8). The alternative with the highest u_i value represents the best alternative.

$$r(u_i) = \left\{ A_{i|\underset{i}{\text{maks}}\, u_i} \succ \cdots \succ A_{i|\underset{i}{\min}\, u_i} \right\} \tag{8}$$

In the full multiplicative approach, the presence of zero or negative values in the X data matrix causes a problem in the solution. It is possible to overcome this problem by replacing the zero value with the value 100. For example, the new value of -3.4 is used in the solution as 96.6. This transformation needs to be performed for all values in the relevant column (Brauers and Zavadskas, 2013).

3.4. Borda rules and improved Borda rule

Combining the results of the ratio approach, the reference point approach, and the full multiplicative approach, it is possible to express them in a single value. Thus, a single final ranking of alternatives can be obtained. Brauers and Zavadskas (2011) used rank dominance theory to obtain the final ranking. Thanks to the application of the axiom *"an ordinal scale of a certain kind, a ranking, can be converted in an ordinal scale of another kind"*, the ordinal scales can be changed by another type of ordinal scale with the help of principles such as dominance, transitivity, equability, and circular reasoning (Brauers and Zavadskas, 2011). However, rank dominance theory has been found to be complex and criticised because it neglects the relative importance of alternatives and uses only rank values and the possible negative occurrences of circular reasoning. For this reason, the improved Borda rule is used within the scope of the study.

The Borda rule aims to collect the ranking values of the alternatives in order to obtain the final ranking results. However, this rule has been improved by Wu et al. (2018) using the weighted arithmetic operator, as ignoring the ordered relationships between the alternatives may distort the results. The improved Borda rule uses the original and ordinal values obtained in the ratio approach, the reference point approach, and the full multiplicative approach, which are the sub-approaches of the MULTIMOORA method. In this respect, it is superior to the rank dominance theory, which uses only the ordinal values of the sub-approaches. To use the improved Borda rule, firstly, the normalised values y_i^*, z_i^* and u_i^* are calculated by using vector normalisation of y_i, z_i and u_i values. The improved Borda rule value for the alternatives is calculated using equation (9) (Wu et al., 2018).

$$IBR(A_i) = y_i^* \frac{m-r(y_i)+1}{m(m+1)/2} - z_i^* \frac{r(z_i)}{m(m+1)/2} + u_i^* \frac{m-r(u_i)+1}{m(m+1)/2} \quad (9)$$

where $r(y_i)$, $r(z_i)$ and $r(u_i)$ represent the rank values obtained from the ratio approach, reference point approach and full multiplicative approach of the alternatives, respectively. The best alternative based on the improved Borda rule represents the alternative with the largest $IBR(A_i)$ (Hafezalkotob et al., 2019).

4. Application and research findings

4.1. Data

As a result of Russia's invasion of Ukraine in 2022, the European Council, European Commission, NATO, and countries such as the USA, England, and Canada took sides with Ukraine and said that this invasion was a grave violation of international law, and that Russia should stop its military actions. As a result of this adverse condition, it was decided to choose the country whose defense performance would be measured. The countries that are the subject of the study and presented in Table 1 represent the alternatives in the MULTIMOORA method. When looking at the countries whose defense performance is desired to be measured, all NATO member countries except Luxembourg and all EU member countries except Luxembourg and Malta are included in the study. Since Luxembourg and Malta do not have some values for defense performance indicators, these two countries were excluded from the data set. Consequently, there are 36 countries whose performance will be measured with Russia and Ukraine.

Table 1. Countries to Measured Defense Performance

A_1	Albania	A_{13}	Germany	A_{25}	Poland
A_2	Austria	A_{14}	Greece	A_{26}	Portugal
A_3	Belgium	A_{15}	Hungary	A_{27}	Romania
A_4	Bulgaria	A_{16}	Iceland	A_{28}	Russian Federation
A_5	Canada	A_{17}	Ireland	A_{29}	Slovakia
A_6	Croatia	A_{18}	Italy	A_{30}	Slovenia
A_7	Cyprus	A_{19}	Latvia	A_{31}	Spain
A_8	Czechia	A_{20}	Lithuania	A_{32}	Sweden
A_9	Denmark	A_{21}	Montenegro	A_{33}	Turkey
A_{10}	Estonia	A_{22}	Holland	A_{34}	Ukraine
A_{11}	Finland	A_{23}	North Macedonia	A_{35}	United Kingdom
A_{12}	France	A_{24}	Norway	A_{36}	USA

Indicators used to measure the defense performance of countries and representing the objectives of the MULTIMOORA method are presented in Table 2. In the selection of the indicators used in the paper, the literature review and the reports published by organisations such as the Stockholm International Peace Research Institute (SIPRI), the Institute for Economics and Peace (IEP), the Nuclear Threat Initiative (NTI), the Federation of American Scientist (FAS), and the International Institute for Strategic Studies (IISS) were taken into account. A total of 18 indicators were determined, including 5 indicators in the military category, 6 indicators in the economic category, 3 indicators in the demographic category, 1 indicator in the innovation category, and 3 indicators in the negative peace category. The data was compiled from the World Bank, EUROSTAT, IMF, and SIPRI databases, as well as reports of the Global Peace Index, the Nuclear Security Index, FAS, and the Military Balance.

Table 2. Indicators Used in Measuring Defense Performance

Category	Code	Indicator	
Military	c_1	Armed forces personnel (total)	Max
	c_2	Nuclear weapon forces (total)	Max
	c_3	Secure materials (0-100 scale score)	Max
	c_4	Support global efforts (0-100 scale score)	Max
	c_5	Protect facilities score (0-100 scale score)	Max
Economic	c_6	Military expenditure (% of GDP)	Max
	c_7	Arms imports (SIPRI trend indicator values)	Max
	c_8	Arms exports (SIPRI trend indicator values)	Max
	c_9	GDP growth (annual %)	Max
	c_{10}	GDP per capita in purchasing power parity ($)	Max
	c_{11}	Inflation rate, average consumer price (%)	Min
Demographic	c_{12}	Population ages 0-14 (% of total population)	Max
	c_{13}	Population ages 15-64 (% of total population)	Max
	c_{14}	Population ages 65 and above (% of total population)	Min
Innovation	c_{15}	Research and development expenditure (% of GDP)	Max
Negative peace	c_{16}	Ongoing domestic and international conflict (1-5 scale score)	Min
	c_{17}	Societal safety and security (1-5 scale score)	Min
	c_{18}	Militarisation (1-5 scale score)	Min

Considering Russia's military interventions in Ukraine and the results of the actions of the actors involved in this war, it is seen that the military and economic indicators of the countries have great importance in their defensive performance. Military expenditures and the arms trade economy are considered the most significant determinants of the defense economy in terms of guaranteeing peace and security or having a deterrent power in adverse scenarios (Yakovlev, 2007). The role of research and development investments in defense is undeniable due to reasons such as the dynamism of countries' defense systems, the commercialisation of technology, the integration of the defense industry and technological bases, and the efficient implementation of technological innovations in the military field. Similarly, nuclear weapons play a crucial role in defense, thanks to their deterrent effect, as they are both an integrated defense strategy component that includes diplomacy and conventional forces, and the most destructive tool ever invented (Younger, 2000, pp. 1-19). For monitoring country-level progress in nuclear weapons security and strengthening the nuclear weapon security architecture, three rankings have been developed by NTI: secure materials, support global efforts, and protect facilities. These rankings for countries are published every two years since 2012. To measure the presence and absence of war, resolve conflicts and crises, and achieve global peace, the peace status of countries is evaluated by the IEP in three different rankings, such as ongoing domestic and international conflict, social safety and security, and militarisation. In these rankings published annually since 2007, the negative peace level is measured for countries.

4.2. Research Findings

To measure the defense performance of the countries, the study used the MULTIMOORA method. This method consists of three sub-approaches: the ratio approach, the reference point approach, and the full multiplicative approach. By performing vector normalisation in the ratio approach and using equation (3), the ratio approach values of the countries are obtained. The normalised decision matrix is presented in Appendix A. By performing vector normalisation in the reference point approach and using equation (5), the reference point approach values of the countries are obtained. Finally, in the full multiplicative approach, the full multiplicative approximation values of the countries are obtained by using equation (7). To avoid subjective interpretations, it is assumed that the weights of the indicators as decision makers are equal in all sub-approaches. The values and rankings obtained as a result of the application of three sub-approaches to the 2020 data of the countries are presented in Table 3.

In the y_i column of Table 3, the ratio approach values are presented for each country whose defense performance is to be measured. As a result of ranking these values in descending order, a performance ranking can be made for countries ($r(y_i)$). The first three countries with the best performance in defense performance evaluation based on the ratio approach are the USA (3.492), Russia (2.087), and the United Kingdom (1.435). Conversely, the last three countries with relatively poor performance are Albania (0.060), North Macedonia (0.143), and Montenegro (0.230). In the z_i column of the table, the reference point approach values of the countries are presented. As a result of ranking these values in ascending order, a performance ranking can be made for countries ($r(z_i)$). The top three countries with the best performance in defense performance evaluation based on the reference point approach are the USA (0.242), Russia (0.598), and France (0.716). However, the last three countries with relatively poor performance are Slovenia (0.909), Romania (0.909), and North Macedonia (0.909). Finally, in the u_i column of the table, the full multiplicative approach values of the countries are presented. As a result of ranking these values in descending order, a performance ranking can be made for countries ($r(u_i)$). The top three countries with the best performance in defense performance evaluation based on the full multiplicative approach are the USA (1.022E+44), Russia (1.879E+41), and France (4.899E+40). The last three countries with relatively poor performance are Iceland (6.505E+23), North Macedonia (5.467E+24), and Slovenia (2.443E+25).

Table 3. Values and Rankings based on Approaches

	y_i	$r(y_i)$	z_i	$r(z_i)$	u_i	$r(u_i)$	MULTIMOORA
Albania	0.060	36	0.909	25	1.267E+29	31	32
Austria	0.449	25	0.908	21	7.674E+35	22	25
Belgium	0.845	9	0.904	15	5.124E+37	13	11
Bulgaria	0.547	23	0.908	20	1.566E+36	21	20
Canada	1.061	7	0.890	10	1.565E+39	9	8
Croatia	0.313	33	0.909	23	1.836E+34	24	27
Cyprus	0.323	32	0.909	26	5.959E+30	28	29
Czechia	0.685	16	0.909	27	8.063E+25	33	21
Denmark	0.600	19	0.909	22	1.567E+36	20	19
Estonia	0.409	29	0.909	28	1.255E+30	29	31
Finland	0.772	12	0.908	19	5.753E+36	18	14
France	1.100	6	0.716	3	4.899E+40	3	5
Germany	1.016	8	0.790	4	2.491E+39	7	6
Greece	0.380	30	0.907	17	8.493E+36	16	24
Hungary	0.675	17	0.909	29	4.557E+31	26	26
Iceland	0.442	27	0.909	30	6.505E+23	36	33
Ireland	0.584	21	0.909	31	7.917E+30	27	28
Italy	0.749	14	0.831	6	2.788E+39	6	10
Latvia	0.372	31	0.909	32	2.502E+29	30	34
Lithuania	0.573	22	0.903	14	4.383E+37	14	15
Montenegro	0.230	34	0.909	33	1.165E+29	32	35
Holland	1.307	4	0.862	7	4.293E+39	5	4
North Macedonia	0.143	35	0.909	34	5.467E+24	35	36
Norway	1.197	5	0.902	13	3.578E+38	10	7
Poland	0.844	10	0.908	18	6.957E+37	12	13
Portugal	0.487	24	0.905	16	1.732E+37	15	18
Romania	0.843	11	0.909	35	4.152E+32	25	22
Russia	2.087	2	0.598	2	1.879E+41	2	2
Slovakia	0.587	20	0.909	24	1.018E+35	23	23
Slovenia	0.613	18	0.909	36	2.443E+25	34	30
Spain	0.755	13	0.793	5	1.959E+39	8	9

	y_i	$r(y_i)$	z_i	$r(z_i)$	u_i	$r(u_i)$	MULTIMOORA
Sweden	0.738	15	0.881	9	5.697E+36	19	12
Turkey	0.418	28	0.895	11	1.540E+38	11	17
Ukraine	0.449	26	0.898	12	8.170E+36	17	16
UK	1.435	3	0.867	8	3.209E+40	4	3
USA	3.492	1	0.242	1	1.022E+44	1	1

The improved Borda rule given in equation (9) was used as a ranking aggregation tool. Thus, it is possible to obtain the final ranking for the countries characterised as alternatives using the MULTIMOORA method. The ratio approach ranking, the reference point approach ranking, the full multiplicative approach ranking of the countries, and the MULTIMOORA ranking obtained by combining these rankings are presented in the last column of Table 3.

When the MULTIMOORA ranking is taken into consideration, the USA and Russia maintain their place in all rankings. This is an expected result, as the USA has a qualified defense industry and military capacity at the global level. The USA, which is known to be the most capable member of NATO, also has defense agreement obligations against Australia, the Philippines, Japan, South Korea, and Thailand, making the country unique in terms of defense performance on a global basis (The Military Balance 2020, pp. 45-46). Besides, among the items that ensure the USA ranks first, there are indicators such as the fact that it allocates 778 billion dollars to its military expenditures in the relevant year, that the country's investment in military power is more than the sum of the ten countries that follow it, that it has a nuclear arsenal, and that it is the largest supplier of arms exports (Kristensen and Korda, 2020a, p. 47; The Military Balance 2021, pp. 23-29).

Russia, which is in the second place of the MULTIMOORA ranking, takes place in the relevant ranking due to indicators such as having the largest nuclear arsenal, conventional military capacity, being close to the United States in terms of nuclear weapons forces, warplanes, and missile systems at parity with military power (Kristensen & Korda, 2020b, p. 104; The Military Balance 2021, pp. 23-29). Besides, in the current international conjuncture, where military power is described as having the capacity to fight in a conventional war and having nuclear deterrence, the most important actors are the USA, Russia, and China (Mearsheimer, 2006, p. 113). Since Russia, which invaded Ukraine for the second time in 2022, poses a more open challenge than the USA and China, Russia, which is the central actor in issues such as nuclear weapons power, military capacity, and energy supply, is trying to strengthen its position (Michta, 2022: 268). The United Kingdom, which is in third place, adopted a defense policy based on the use of armed forces in 2020 based on reducing threats (The Military Balance 2021, p. 156). In this context, the country with the largest military expenditure in the relevant year after the USA, China, and India, also has the largest nuclear power after the USA and Russia (The Military Balance 2021, p. 23). Therefore, this performance rank is to be expected for the UK.

Finally, when looking at Ukraine, it is seen that the country ranks 16th. It is known that Russia's attacks on Ukraine continue in this study, in which performance evaluations are made for 2020. Currently, the process continues with the deterioration of the territorial integrity of Ukraine. The fact that the Russia-Ukraine war takes place on the international political scene reveals the importance of defense performance evaluation for countries. Because the predictability of the military power balances of the countries results in the countries having power on the international stage and having a deterrent effect in adverse scenarios. The points deserving emphasis here are the evaluation of the defense performance of countries, which can be measured by many indicators, with one of the multi-purpose decision-making methods in this study. The study's findings reveal the evaluations of the military power balances of the countries in the presence of possible conflicts or crises, and thus the actions that countries can take can be predicted. Besides, the findings helped determine which countries are at a similar level of owning defense performance. It is possible to evaluate countries with similar defense performance together on the military, economic, demographic, innovation, and negative peace indicators. The possible alliance configurations can be identified, and this can be a reference for the countries in deciding to take part in relevant alliances. For example, when the NATO memberships of Sweden and Finland are taken into consideration at present, the possible membership of these two countries in the union will affect the increasing the defense performance of the union.

5. Summary and conclusions

"If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle." (Sun Tzu)

As the Russia-Ukraine war continues, the essence of the current security problem is that countries with the global defense industry, military capacity, and nuclear power have more say over other countries within the possibilities provided by these power elements. The point that needs to be clarified is whether the countries have the dynamics to prevent these conflicts or crises or to produce solutions when necessary. This concept identified as the defense can be shaped by the countries' military power, economic wealth, demographic structures, and technological developments. This study has tried to answer the question of the level of defense performance of the countries in terms of preventing these conflicts or crises, producing solutions when necessary, and providing their security in case of possible conflicts or crises. The defense performance of countries is seen as a conceptualisation that requires the evaluation of many different indicators such as military, economic, demographic, and innovation. Therefore, there is a need for effective and unbiased evaluation methods that allow the inclusion of a large number of indicators in testing this conceptualisation. To overcome these limitations, the

MULTIMOORA method, which is one of the multi-purpose decision making methods, was used within the scope of the study.

In the MULTIMOORA method, while measuring the defense performances of 36 countries in 2020, the countries' values of 18 indicators associated with the military, economic, demographic, innovation, and negative peace categories were evaluated within the ratio approach, reference point approach, and the full multiplicative approach. The rankings of these approaches were aggregated with the improved Borda rule. Consequently, it is possible to obtain a final ranking value for countries.

While there are a significant number of studies in the literature on the economic effects of countries' defense expenditures, there are no studies evaluating the defense performance of countries in an analytical context involving the Russia-Ukraine war and the actors that may be a party to the war. It is believed that this study will be beneficial in filling the relevant gap in the literature. In the ranking of defense performance, the best values are, respectively, for countries such as the USA, Russia, and the United Kingdom; the worst values were found to belong to countries such as North Macedonia, Montenegro, and Latvia, respectively. It is expected that the ranking of defense performance will contribute to academic literature and policymakers, as the Russia-Ukraine war is on the agenda of international politics. As well as the classification, the ranking results aid to interpret the country's performances in an evaluation that includes different indicators such as military, economic, demographic, innovation, and negative peace. Through this ranking and classification, the defense performances of the countries can be learned in case of peace, and predictions can be made about the strength of the countries or possible alliances that may be formed by the countries in case of war.

In future studies, the objective is to expand the set of indicators obtained from different sources related to defense performance to measure the defense performance of countries in a more realistic way. Expanding the indicators of defense performance will be tried to make it possible to measure the full potential of the defense performance of the countries.

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Appendix-A

	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}	c_{14}	c_{15}	c_{16}	c_{17}	c_{18}
A_1	0,004	0,000	0,000	0,160	0,000	0,124	0,004	0,000	0,169	0,052	0,169	0,174	0,175	0,129	0,000	0,154	0,201	0,148
A_2	0,010	0,000	0,000	0,195	0,000	0,068	0,009	0,001	0,163	0,210	0,166	0,146	0,170	0,169	0,273	0,110	0,123	0,120
A_3	0,012	0,000	0,327	0,000	0,224	0,087	0,063	0,005	0,165	0,201	0,152	0,172	0,163	0,169	0,296	0,121	0,151	0,138
A_4	0,017	0,000	0,000	0,175	0,210	0,147	0,032	0,001	0,167	0,093	0,163	0,149	0,164	0,189	0,073	0,110	0,171	0,163
A_5	0,033	0,000	0,356	0,000	0,251	0,114	0,151	0,019	0,166	0,176	0,156	0,160	0,170	0,159	0,145	0,110	0,120	0,136
A_6	0,008	0,000	0,000	0,183	0,000	0,149	0,004	0,000	0,161	0,109	0,146	0,147	0,165	0,187	0,106	0,154	0,151	0,143
A_7	0,007	0,000	0,000	0,178	0,000	0,144	0,021	0,000	0,166	0,150	0,130	0,168	0,177	0,127	0,070	0,176	0,194	0,140
A_8	0,011	0,000	0,000	0,220	0,229	0,109	0,000	0,000	0,165	0,157	0,194	0,160	0,164	0,177	0,170	0,110	0,133	0,122
A_9	0,007	0,000	0,000	0,227	0,000	0,117	0,047	0,000	0,171	0,228	0,150	0,165	0,163	0,177	0,253	0,133	0,111	0,119
A_{10}	0,003	0,000	0,000	0,190	0,000	0,186	0,011	0,000	0,170	0,142	0,137	0,167	0,162	0,179	0,153	0,155	0,163	0,143
A_{11}	0,012	0,000	0,000	0,234	0,249	0,124	0,033	0,001	0,171	0,192	0,152	0,161	0,158	0,198	0,250	0,133	0,116	0,157
A_{12}	0,139	0,035	0,282	0,000	0,215	0,168	0,106	0,194	0,161	0,178	0,153	0,179	0,158	0,182	0,201	0,137	0,168	0,250
A_{13}	0,084	0,000	0,348	0,000	0,235	0,113	0,024	0,120	0,167	0,207	0,152	0,141	0,165	0,191	0,268	0,112	0,137	0,173
A_{14}	0,067	0,000	0,000	0,165	0,000	0,226	0,062	0,002	0,159	0,106	0,127	0,138	0,164	0,196	0,128	0,198	0,151	0,197
A_{15}	0,018	0,000	0,000	0,222	0,235	0,130	0,049	0,000	0,167	0,126	0,195	0,146	0,168	0,177	0,137	0,154	0,160	0,104
A_{16}	0,000	0,000	0,000	0,180	0,000	0,000	0,000	0,000	0,164	0,203	0,163	0,197	0,167	0,137	0,211	0,110	0,098	0,093
A_{17}	0,004	0,000	0,000	0,180	0,000	0,023	0,008	0,000	0,185	0,353	0,138	0,211	0,166	0,128	0,105	0,132	0,133	0,115
A_{18}	0,156	0,000	0,307	0,000	0,000	0,127	0,096	0,078	0,159	0,159	0,144	0,131	0,163	0,205	0,131	0,110	0,175	0,179
A_{19}	0,003	0,000	0,000	0,185	0,000	0,186	0,004	0,000	0,168	0,119	0,147	0,166	0,161	0,182	0,060	0,154	0,173	0,131
A_{20}	0,017	0,000	0,000	0,215	0,000	0,171	0,154	0,006	0,175	0,147	0,162	0,157	0,164	0,181	0,099	0,154	0,165	0,149
A_{21}	0,005	0,000	0,000	0,163	0,000	0,166	0,001	0,000	0,148	0,076	0,143	0,183	0,170	0,139	0,031	0,154	0,219	0,139
A_{22}	0,019	0,000	0,335	0,000	0,232	0,115	0,446	0,047	0,168	0,224	0,162	0,159	0,165	0,176	0,196	0,111	0,135	0,192
A_{23}	0,007	0,000	0,000	0,160	0,000	0,104	0,000	0,000	0,164	0,063	0,163	0,165	0,178	0,127	0,032	0,176	0,191	0,154
A_{24}	0,011	0,000	0,335	0,000	0,226	0,156	0,329	0,007	0,174	0,237	0,163	0,175	0,167	0,154	0,194	0,133	0,105	0,214
A_{25}	0,086	0,000	0,000	0,220	0,218	0,179	0,141	0,001	0,170	0,130	0,200	0,154	0,169	0,165	0,119	0,154	0,162	0,140
A_{26}	0,024	0,000	0,000	0,175	0,000	0,173	0,034	0,004	0,160	0,129	0,144	0,132	0,165	0,200	0,138	0,110	0,119	0,116
A_{27}	0,058	0,000	0,000	0,210	0,229	0,187	0,137	0,000	0,168	0,122	0,179	0,157	0,167	0,169	0,040	0,110	0,156	0,158
A_{28}	0,664	0,739	0,233	0,000	0,179	0,345	0,019	0,311	0,170	0,113	0,195	0,186	0,170	0,136	0,094	0,324	0,254	0,293
A_{29}	0,007	0,000	0,000	0,192	0,204	0,147	0,026	0,000	0,167	0,118	0,175	0,157	0,174	0,147	0,078	0,154	0,150	0,129
A_{30}	0,003	0,000	0,000	0,205	0,226	0,089	0,000	0,000	0,167	0,150	0,141	0,153	0,164	0,182	0,183	0,154	0,122	0,106
A_{31}	0,091	0,000	0,000	0,222	0,207	0,113	0,042	0,117	0,156	0,143	0,141	0,146	0,168	0,176	0,120	0,149	0,160	0,171
A_{32}	0,007	0,000	0,000	0,242	0,229	0,099	0,002	0,028	0,170	0,208	0,156	0,178	0,159	0,179	0,301	0,139	0,124	0,162
A_{33}	0,234	0,000	0,000	0,173	0,000	0,224	0,063	0,014	0,178	0,103	0,325	0,242	0,172	0,079	0,093	0,348	0,279	0,185
A_{34}	0,142	0,000	0,000	0,192	0,182	0,334	0,013	0,011	0,168	0,049	0,185	0,162	0,172	0,149	0,035	0,337	0,278	0,190
A_{35}	0,068	0,026	0,311	0,000	0,246	0,182	0,558	0,042	0,159	0,176	0,159	0,179	0,163	0,164	0,146	0,133	0,152	0,226
A_{36}	0,634	0,673	0,311	0,000	0,232	0,302	0,502	0,909	0,169	0,238	0,157	0,186	0,167	0,146	0,294	0,193	0,194	0,277