Benchmarking International Trade Performance of OECD Countries: TOPSIS and AHP Approaches[1]

OECD Ülkelerinin Uluslararasi Ticaret Performans Değerlendirmesi: TOPSIS ve AHP Yaklaşımları

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Abstract

Economic performance of countries has been evaluated on several counts from both microeconomic and macroeconomic framework in many empirical studies by using many quantitative technics such as "Multi Criteria Decision Making" methods. After all, this paper has the characteristic of first research which examines international trade performance. Today, governments as well as firms are seeking new opportunities to take a bigger share of global market through trade by managing scarce resources, trade agreements and arrangements, making innovation, increasing productivity et cetera. It is within this context that the authors aim at evaluating international trade performance of OECD countries by using TOPSIS and AHP approaches between 1999-2014 in the light of three foreign trade performance indicators, namely; Volume of Exports Per Capita, Normalized Trade Balance and Terms of Trade. Our findings indicate that Norway, Ireland and Germany are ranked among the top three countries while Turkey, USA and the Greece are the bottom three.

Key Words: Macroeconomics, International Trade Performance, Multi Criteria Decision Making, TOPSIS, AHP.

Öz

Ekonomilerin ekonomik performansları "Çok Kriterli Karar Verme" yöntemleri gibi çeşitli kantitatif teknikler kullanılarak hem makroekonomik hem de mikroekonomik açıdan çok sayıda ampirik çalışmada değerlendirilmiştir. Buna karşın, bu araştırma ülkelerin uluslararası ticaret performanslarını ampirik olarak karşılaştıran ilk araştırma özelliğini taşımaktadır. Günümüzde firmalar gibi hükümetler de dış ticaret vasıtasıyla kıt kaynak yönetimi, dış ticaret anlaşmaları ve düzenlemeleri, inovasyon, verimlilik artırımı vb. stratejiler izleyerek küresel piyasadan daha büyük bir pay alabilmek için yeni fırsatlar kollamaktadırlar. Bu araştırma, OECD ülkelerinin 1999-2014 yılları arasındaki uluslararası ticaret performanslarını Kişi Başı İhracat Hacmi, Normalleştirilmiş Ticaret Dengesi ve Ticaret Hadleri değişkenlerini kullanarak TOPSIS ve AHP yaklaşımları yardımıyla incelemeyi amaçlamaktadır. Araştırmada elde edilen bulgular göstermektedir ki; Norveç, İrlanda ve Almanya uluslararası ticaret performansı değerlendirmesinde ilk üç sırayı alırken Türkiye, ABD ve Yunanistan son üç sırada yer almışlardır.

Anahtar Kelimeler: Makroekonomi, Uluslararası Ticaret Performansı, Çok Kriterli Karar Verme, TOPSIS, AHP.

Introduction

Comparative advantages and the specialization theories which developed by David Ricardo and Adam Smith emphasize the importance of international trade. They state that foreign trade is one of the constituents of a nation's wealth and everybody can be winner by taking part in it. Foreign trade has crucial role on economic growth performance of both emerging and advanced countries by encouraging technological innovation, increasing the level of specialization through division of labor and improving efficiency of domestic and foreign investments. For these reasons foreign trade performance, indicator of comparative advantages and international specialization represent country's productivity level. Moreover, foreign trade may measure competitive power of an economy which illustrates its macroeconomic performance. In addition to this, national competitiveness shows creative, productive and

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distributive skills of an economy in foreign trade during gaining increasing returns on its own factor endowment (Scott & Lodge, 1985).

In phase with the bottom lines of the classical, neoclassical and new international trade theories, foreign trade constitutes an identifier element affecting economic growth of individual economies and global economy (Jeníček, 2003). Neo-Kaldorian approach suggests that liveliness of exportation activities may stimulate economic growth through its aggregate demand growing effect and also scale economies that consequence of speed-up in production (Araujo & Trigg, 2015). International trade alters the sucture of national manufacturing as well as in accordance with requested area of utilization with regard to country's factor endowment (Krepl & Jeníček, 2009). There is also interrelation between foreign trade and total factor productivity. Trade is significant determinant for long-term total factor productivity through its advanced equipment supplying property from industrial countries to developing countries (Teixeira & Fortuna, 2010). Additionally trade openness may increase country's chance to take advantage from R&D opportunities and innovations of foreign countries (Lichtenberg, Pottelsberghe, & Potterie, 1998). Beside these, on one hand international trade can affect living standards by providing large variety of products to consumers from different countries, increasing capacity and employment and removing price differences among countries. On the other hand exporter firms precede non-exporter firms in productivity (Alvarez & López, 2005). Additionally, information development and transfer allow firms to come in possession of worldwide pro-active and prosperous. Business operations, such as R&D, innovation and information transfer substantially interact with microeconomic foreign trade performance (Grossman & Helpman, 1989). In a nutshell international trade plays an essential role in a country in terms of microeconomic perspective as well as macroeconomic context. Because of these reasons, evaluation of foreign trade performances among different economies may enlighten our prospect to the countries.

Macroeconomic performances of countries can be compared by using several techniques and findings that acquired as an output of empirical analyses are accepted as economic performances of countries for particular time periods. Decision makers should appraise a finite number of alternatives to obtain most convenient one by categorizing them into predetermined homogeneous clusters and ordering them accordingly with their ranking scores by means of related criteria (Zavadskas & Turskis, 2011). Multi Criteria Decision Making (MCDM) methods that benchmark alternatives by evaluating more than one factor enable researchers to select most appropriate one among alternatives and they are frequently used to compare such organizations (Urfalioğlu & Genç, 2013).

MCDM methods can procure a miscellaneous evaluation by taking more than one foreign trade performance measures into account and allow for more inclusive analysis than fundamental methods. In this study we assess international trade performance of OECD Countries by using TOPSIS and AHP methods in consideration of three indicators namely; Volume of Exports Per Capita, Normalized Trade Balance and Terms of Trade for the period of 1999-2014.

The paper is organized as follows: after the introduction section, the second section provides a literature review while data, methodology and the empirical results are given in the following section. Finally, the last section concludes the paper.

Literature Review

Performance of economic organizations has been evaluated on several counts from both microeconomic and macroeconomic perspectives in many empirical researches by using a variety of approaches such as MCDM methods, after all this study has the feature of first research that examines international trade performance.

Eleren & Karagül (2008) investigate economic performance of Turkey between 1986 and 2006 by using TOPSIS methodology by employing seven macroeconomic indicators namely economic growth rate, current account deficit, total national debt, consumer price index, current account balance, sovereign spread and unemployment rate. They conclude that 1986 is the best year in terms of economic performance, while 1999, 2000, 2001 and 2006 are among worst years as a result of national and global crises. Mangır & Erdoğan (2011) analyze effects of global financial crisis on Italy, Greece, Spanish, Portugal, Ireland and Turkey during 2002 and 2009. Authors utilize Fuzzy TOPSIS Method and employ some data namely; economic growth rate, inflation rate, unemployment rate, current account balance and lastly budget balance rate to measure macroeconomic performance. They argue that Turkey overcomes global financial crisis with relatively lower losses by comparison with other five countries. Urfalioğlu & Genç (2013) compare economic performance of Turkey and European Union countries by using ELECTRE, TOPSIS and PROMETHEE methods and cross-section data of 2010. They select GDP per capita, economic growth rate, export, import, employment and inflation rate as indicator for economic performance. They claim that results of these three methods have the same trend and countries with best performances are similar according to all models. The results of their TOPSIS analysis indicate that Turkey is ranked as thirty-first among European Union countries. Moreover, Mandic et al. (2014) evaluate performance of banks by employing Fuzzy AHP and TOPSIS methods. They use following financial indicators; equity, portfolio, sources, liquid assets, cash, net interest income, core business net income and earnings before tax to determine best performing financial intermediary institution in Serbian banking sector between 2005 and 2010. They find that Banca Intesa has the best ranking. Eyüboğlu (2015) compares macro performances of developing countries such as Turkey, Poland, Mexico, Chile, Malaysia, Hungary, Indonesia, China, Argentina and Brazil by employing TOPSIS-AHP couple and using the data of economic growth rate, inflation rate, unemployment rate and the current account balance. They suggest that Malaysia and China are the highest performance countries between 2003 and 2013. Wanke et al. (2016) utilize TOPSIS approach to examine efficiency of banks in Malaysia for the period of 2009 and 2013 by using personnel expenditure, total business expenditures, asset earnings, deposits, net interest income, business profit and net income to measure performance of institutions. They argue that Maybank Islamic Berhad is the most efficient bank in Malaysia during chosen period.

Data and Methodology

In this study, Volume of Exports Per Capita, Normalized Trade Balance and Terms of Trade are used to measure international trade performance of OECD countries covering the period between 1999 and 2014. International trade productivity interacts with export performance which can be measured by the Volume of Exports Per Capita (VEPC) (Majerová & Nevima, 2015). VEPC is measured as total value of exported goods and services (EX) divided by population (POP):

$$\mathrm{VEPC} = \frac{\mathrm{EX}}{\mathrm{POP}}$$

Higher levels of exports may not represent productivity in international trade alone because of differences in labor force magnitudes. For this reason, per capita export is more convenient measure. Higher ratio of VEPC indicates higher level of international division of labor and higher earnings from foreign trade. Second international trade indicator, Normalized Trade Balance (TB), can be calculated as trade balance divided by the total value of trade:

$$\mathrm{TB} = \frac{\mathrm{EX} - \mathrm{IM}}{\mathrm{EX} + \mathrm{IM}}$$

TB is frequently described as measures of trade specialization and competition power of domestic products, because dispersion of industry-specific balances around the world trade balance pictures the shape of comparative advantages and disadvantageousness of an economy (Iapadre, 2001). TB gives an opportunity to compare economies with different domestic incomes across time and varies in the range of -1 to +1. When foreign trade is balanced, TB takes the value of zero. Third and last indicator for international trade measure is Terms of Trade (TT) which refers to the ratio of export prices (P_{EX}) to import prices (P_{IM}):

$$TT = \frac{P_{EX}}{P_{IM}}$$

TT is widely used to measure international trade gains and losses which resultant from fluctuations in export and import prices. TT is generally accepted measure for improvement in foreign trade and higher TT values than one indicates favorable progress (Krepl & Jeníček, 2009). Additionally, there is a significant positive relationship between trade and economic growth which is essential for trade performance (Mendoza, 1997). Terms of trade and population data are obtained from the World Development Indicators and export-import data are from the World Trade Organization Statistics Database.

TOPSİS, one of the multivariate decision methods has been used to obtain the country which has the best trade performance between OECD countries. TOPSİS method can easily be applied on raw data set. Therefore, any qualitative transformation for the data set isn't needed. TOPSİS is applied and adapted to many subjects in many different research areas to solve multivariate decision problems. Thus, it was broadly used. TOPSIS method consists of six consecutive stages. These stages can be explained as below:

Step.1: The decision matrix must be created. Alternatives which are wanted to rank by their superiority take place at rows of the matrix and evaluation factors which are going to be used in decision making takes place at columns. A matrix is the beginning matrix which is determined by decision maker. Every a_{ij} in decision matrix represents the real value of the ith alternative according to jth criteria.

$$A_{ij} = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{bmatrix} \quad (1)$$

Step.2: The normalization matrix can be named as NDM (Normalized Decision Matrix) which represents the relative performance of the generated design alternatives. NDM is created via benefits from A_{ij} Decision Matrix. There are many normalization process methods. Among them, one of the most common used methods is vector normalization. As described below, every single value in decision matrix is divided by sum of square of the column values which is at same column with the dividend value. The normalized value $\{r_{ij}\}$ is calculated as

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}} \quad R_{ij} = \begin{bmatrix} r_{11} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mn} \end{bmatrix} \quad (2)$$

Step.3: The weights which imply importance of the criteria are defined. In this paper, AHP method is used to find out the weights. By the way of weights of criteria, weighted normalized matrix is obtained. While determining the importance degrees of criteria, the consistency rate of weights are controlled. When consistency rate is bigger than 0.1, all estimations needed to be reviewed (Supçiller & Çapraz, 2011). In this paper, "Super Decision" program is employed to apply AHP method.

Step.4: At this stage, normalized matrix is multiplied with the weights of criteria. By this way, V_{ij} matrix which represents Weighted Decision Matrix can be obtained.

$$V_{ij} = \begin{bmatrix} w_1 r_{11} & \cdots & w_n r_{1n} \\ \vdots & \ddots & \vdots \\ w_1 r_{m1} & \cdots & w_n r_{mn} \end{bmatrix} \quad (3)$$

Step.5: Positive and negative ideal solutions are detected. Positive ideal solutions (A^+) and negative ideal solutions (A^-) are acquired according to the Weighted Decision Matrix (Vij). Positive ideal solutions and negative ideal solutions are consists of the highest and the lowest values of rows at V_{ij} respectively.

$$A^* = \left\{ (\max_i v_{ij} \,\middle|\, j \in J), (\min_i v_{ij} \,\middle|\, j \in J' \right\} \qquad A^- = \left\{ (\min_i v_{ij} \,\middle|\, j \in J), (\max_i v_{ij} \,\middle|\, j \in J' \right\} \quad (4)$$

The distance is evaluated to positive ideal solution and to negative ideal solution. Final ranking for decision making will be obtained by comparing distances.

Step.6: The separation distance of each competitive design alternative from the positive ideal solution and the negative ideal solution is measured. Euclidean distance method is applied in this paper. Every alternative's distance to the best performed value (v_j^+) and to the worst performed value (v_j^-) are calculated (Özcan, Elebi, & Esnaf, 2011). These values are named as S^+ and S^- respectively.

$$S_i^+ = \sqrt{\sum_{j=1}^{n} (V_{ij} - V_j^+)^2} \quad S_i^- = \sqrt{\sum_{j=1}^{n} (V_{ij} - V_j^-)^2} \quad (5)$$

There are separation distances (S_i^+, S_i^-) as many as of the positive ideal solutions and negative ideal solutions.

Step.7: The relative closeness (RC) to the ideal solution for each competitive design alternative is computed. C_i^* takes values between $0 \leq C_i^* \leq 1$ interval.

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^+} \quad (6)$$

When all stages are fulfilled, reaching the satisfactory results can be possible. At the end, total score shows the difference and ranking between all the alternatives.

The preference order of the alternatives, in accordance with their relative closeness to the ideal solution, is obtained. Higher value of relative closeness stands for higher preference order among generated design alternatives and is preferred (Lin, Wang, Chen, & Chang, 2008).

Findings

In this study, Volume of Exports Per Capita, Normalized Trade Balance and Terms of Trade are used to measure foreign trade performance of OECD countries covering the period between the years 1999 and 2014. As a matter of example only the year of 2012 will be evaluated in this paper. In the year of 2012, the foreign trade performance of the 34 countries will be evaluated in following pages and others are calculated similarly.

First "Standard Decision Matrix" is constituted. "Volume of Exports Per Capita", "Normalized Trade Balance" and "Terms of Trade" is represented as "VEPC", "TB" and "TT" subsequently.

Step.1: Decision Matrix consisted according to three criteria.

Table 1: Standard decision matrix

Country	Year	VEPC	TB	TT

Australia	2012	11293.21	-0.00824	4.43E+10
Austria	2012	19764.08	-0.03449	-3.4E+09
Belgium	2012	40072.71	0.007694	-4.4E+09
Canada	2012	13108.93	-0.02079	1.28E+10
Chile	2012	4473.7	-0.01446	6.97E+12
Czech Republic	2012	14940.94	0.052367	-6.3E+10
Denmark	2012	18862.14	0.068614	-1.9E+10
Estonia	2012	12162	-0.0585	-3.5E+07
Finland	2012	13497.84	-0.02267	-1.9E+09
France	2012	8664.05	-0.08503	-1.5E+10
Germany	2012	17470.76	0.094174	-3.8E+10
Greece	2012	3195.011	-0.28235	-1.1E+09
Hungary	2012	10440.14	0.042236	-5.5E+11
Iceland	2012	15788.6	0.029654	-5.2E+10
Ireland	2012	25457.95	0.300785	-4.1E+09
Israel	2012	7981.877	-0.08844	-1.2E+09
Italy	2012	8419.691	0.012836	-1.8E+10
Japan	2012	6260.259	-0.05181	-6.5E+12
Korea, Republic of	2012	10956.43	0.026498	-3.6E+13
Luxembourg	2012	35471.69	-0.18779	8.09E+08
Mexico	2012	3036.291	-0.01309	-1.2E+11
Netherlands	2012	39115.22	0.055097	-8.9E+09
New Zealand	2012	8462.8	-0.01256	-1.9E+09
Norway	2012	32071.27	0.296642	1.27E+11
Poland	2012	4870.168	-0.0356	-8.4E+09
Portugal	2012	5524.541	-0.10987	-8.6E+08
Slovak Republic	2012	14907.14	0.020336	-1.6E+09
Slovenia	2012	15634.5	0.001993	-6.1E+08
Spain	2012	6312.395	-0.06653	-1.6E+10
Sweden	2012	18104.66	0.023484	-1.2E+10
Switzerland	2012	39073.33	0.027124	-4.5E+09
Turkey	2012	2057.538	-0.21615	-4.7E+09
United Kingdom	2012	7422.131	-0.18766	-1.3E+09
United States	2012	4920.855	-0.2037	-1.9E+10

Step.2: Equation 2 is used to normalize the Decision Matrix on Table1. NVEPC, NTB, NTT are represent for Normalized Volume of Exports per Capita, Normalized Trade Balance and Normalized Terms of Trade.

$$\frac{11293.21}{\sqrt{11293.21^2 + 19764.08^2 \ldots\ldots + 44929.855^2)}} \quad (7)$$

Table 2: Normalized decision matrix

NVEPC	NTB	NTT
0.106181	-0.01185	0.001195
0.185825	-0.04961	-9.2E-05
0.376771	0.011069	-0.00012
0.123252	-0.02991	0.000346
0.042063	-0.0208	0.188008
0.140477	0.075334	-0.00169
0.177345	0.098708	-0.00052
0.114349	-0.08415	-9.3E-07
0.126909	-0.03262	-5.2E-05
0.081461	-0.12233	-0.00041
0.164263	0.135478	-0.00102
0.03004	-0.40619	-2.9E-05
0.09816	0.06076	-0.01485
0.148447	0.04266	-0.0014
0.23936	0.432707	-0.00011
0.075047	-0.12722	-3.3E-05
0.079163	0.018465	-0.00048
0.05886	-0.07454	-0.17651
0.103014	0.038119	-0.96605
0.333511	-0.27015	2.18E-05
0.028548	-0.01883	-0.00323
0.367768	0.079262	-0.00024
0.079569	-0.01806	-5.2E-05
0.30154	0.426746	0.003416
0.04579	-0.05121	-0.00023
0.051943	-0.15805	-2.3E-05
0.140159	0.029255	-4.3E-05
0.146998	0.002867	-1.6E-05
0.05935	-0.09571	-0.00043
0.170223	0.033784	-0.00032
0.367374	0.039021	-0.00012
0.019345	-0.31095	-0.00013
0.069784	-0.26997	-3.5E-05
0.046267	-0.29305	-0.00051

Step.3: Comparison Matrix is composed by experts' opinions. After normalization of the comparison matrix, mean values of every row shows the needed weights of every criteria but the comparison matrix must be consistent to be accepted (Bulut & Soylu, 2009).

Table 3: Comparison matrix with expert opinions

	TB	TT	VEPC
TB	1.0	3	7
TT	0.33	1.0	5
VEPC	0.14	0.2	1.0

To get consistency and weights that are going to be multiplied with Normalized Decision Matrix's columns, Super Decisions Program is used. The weights are shown in the table 4.

Table 4: Weights of the criteria

Inconsistency	0.06239	
Name	Normalized	Idealized
TB	0.6491	1.0
TT	0.2789	0.429
VEPC	0.0719	0.110

As seen as on table 4, the most important criterion for measuring international trade performance is seemed as TB (0.6491). Afterwards, TT (0.2789) and finally VEPC (0.0719) follow subsequently. Consistency rate has been found 0.06239 and it implies that importance degrees of criteria are consistent. Consequently, weights w_1=0.0719. w_2=0.6491. w_3=0.2789 are accepted.

Step.4: The decision matrix's columns are multiplied by w_1, w_2, and w_3 values subsequently and the table 5 is obtained. NVEPCV , NTBV, NTTV are represent for Weighted Normalized Volume of Exports per Capita, Weighted Normalized Trade Balance and Weighted Normalized Terms of Trade.

Table 5: Weighted normalized matrix

NVEPCV	NTBV	NTTV
0.007637	-0.00769	0.000333342
0.013366	-0.0322	-2.5746E-05
0.0271	0.007185	-3.3177E-05
0.008865	-0.01942	9.63808E-05
0.003025	-0.0135	0.052445797
0.010104	0.048901	-0.00047217
0.012756	0.064073	-0.00014374
0.008225	-0.05463	-2.6022E-07
0.009128	-0.02117	-1.4638E-05
0.005859	-0.07941	-0.00011501
0.011815	0.087941	-0.00028382
0.002161	-0.26366	-8.0376E-06
0.00706	0.03944	-0.00414112
0.010677	0.027692	-0.00038977
0.017217	0.280878	-3.0524E-05
0.005398	-0.08258	-9.217E-06

0.005694	0.011986	-0.0001341
0.004234	-0.04838	-0.04923938
0.00741	0.024744	-0.26948287
0.023989	-0.17536	6.08582E-06
0.002053	-0.01223	-0.00090079
0.026453	0.05145	-6.7105E-05
0.005723	-0.01173	-1.4503E-05
0.021689	0.277009	0.000952783
0.003294	-0.03324	-6.3219E-05
0.003736	-0.1026	-6.4901E-06
0.010081	0.01899	-1.196E-05
0.010573	0.001861	-4.5952E-06
0.004269	-0.06213	-0.00012124
0.012244	0.02193	-8.8328E-05
0.026424	0.025329	-3.3567E-05
0.001391	-0.20184	-3.508E-05
0.005019	-0.17524	-9.8762E-06
0.003328	-0.19022	-0.00014116

Step.5: The highest and the lowest value of the every column of the weighted normalized decision matrix is taken to find positive ideal A+ and negative A- set. Because we have 3 criteria, there will be three values for each A+ and A- sets. A^{+}= (0.027100, 0.280878, 0.052446), A^{-}= (0.001391, -0.26366, -0.26948)

Step.6: For every alternative the distances from positive (S+) and negative ideal solutions (S-) are calculated according to equation (5):

$$\boldsymbol{S_i^+} = \sqrt{(0.0076 - 0.027)^{\mathbf{2}} + (0.087 - 0.28)^{\mathbf{2}} + (0.0003 - 0.05)^{\mathbf{2}}} = 0.2938$$

$$\boldsymbol{S_i^-} = \sqrt{(0.0076 - 0.001)^{\mathbf{2}} + (0.087 - 0.26)^{\mathbf{2}} + (0.0003 - 0.27)^{\mathbf{2}}} = 0.3819$$

$\boldsymbol{S_i^+}$ ={0.293885, 0.317745, 0.278679, 0.305368, 0.295364, 0.238542, 0.223552, 0.340102, 0.3071, 0.364716, 0.200595, 0.54763, 0.248789, 0.259161, 0.053399, 0.367867, 0.274819, 0.345364, 0.411862, 0.45925, 0.29897, 0.23536, 0.298037, 0.051921, 0.319367, 0.387748, 0.267632, 0.284384, 0.347762, 0.26464, 0.260883, 0.486245, 0.459654, 0.474621}

$\boldsymbol{S_i^-}$= {0.371968, 0.355421, 0.382914, 0.363848, 0.407702, 0.412479, 0.424363, 0.341122, 0.362593, 0.326389, 0.442947, 0.269476, 0.402877, 0.396718, 0.607766, 0.324688, 0.385422, 0.307994, 0.28847, 0.284487, 0.36791, 0.415343, 0.368923, 0.604875, 0.35452, 0.313952, 0.390619, 0.378426, 0.336422, 0.392753, 0.395912, 0.276449, 0.283633, 0.279182}

Step7: The relative closeness (RC) to the ideal solution for each competitive design alternative is computed. C_i^* values are in between $0 \leq C_i^* \leq 1$ interval and if the result is close to 1, it indicates the closeness to the ideal solution. C_i's can be calculated as equation below:

$$C_1 = \frac{0.293885}{(0.371968 + 0.293885)} = 0.558634$$

C_i={0.558634, 0.527984, 0.578776, 0.543693, 0.579892, 0.633588, 0.654967, 0.500748, 0.541432, 0.472271, 0.688295, 0.329793, 0.618227, 0.604864, 0.919235, 0.468826, 0.583759, 0.471402, 0.411905, 0.38251, 0.551688, 0.638297, 0.553142, 0.920948, 0.526083, 0.447416, 0.59342, 0.570941, 0.491713, 0.59744, 0.602794, 0.362464, 0.381593, 0.370365}

Final Decision: Alternatives are ranked by their biggest value to the smallest. By this way, best alternative can be chosen (Dumanoğlu, 2010).

Table 6: The rank of the foreign trade performances for the 2012, 2013 and 2014

Country	2012	Rank	Country	2013	Rank	Country	2014	Rank
Australia	0.558	16	Australia	0.593	11	Australia	0.601	14
Austria	0.527	21	Austria	0.534	22	Austria	0.575	18
Belgium	0.578	14	Belgium	0.590	13	Belgium	0.618	13
Canada	0.543	19	Canada	0.541	20	Canada	0.589	16
Chile	0.579	13	Chile	0.580	14	Chile	0.668	7
Czech Rep.	0.633	6	Czech Rep.	0.645	6	Czech Rep.	0.679	5
Denmark	0.654	4	Denmark	0.655	5	Denmark	0.666	9
Estonia	0.500	23	Estonia	0.485	25	Estonia	0.506	25
Finland	0.541	20	Finland	0.536	21	Finland	0.568	20
France	0.472	25	France	0.463	26	France	0.492	26
Germany	0.688	3	Germany	0.702	3	Germany	0.737	3
Greece	0.329	34	Greece	0.319	34	Greece	0.326	34
Hungary	0.618	7	Hungary	0.609	9	Hungary	0.622	12
Iceland	0.604	8	Iceland	0.560	16	Iceland	0.548	22
Ireland	0.919	2	Ireland	0.893	2	Ireland	0.872	1
Israel	0.468	27	Israel	0.490	24	Israel	0.523	24
Italy	0.583	12	Italy	0.617	8	Italy	0.667	8
Japan	0.471	26	Japan	0.385	30	Japan	0.473	27
Korea Rep.	0.411	29	Korea Rep.	0.433	29	Korea Rep.	0.444	29
Lux.	0.382	30	Lux.	0.361	31	Lux.	0.400	31
Mexico	0.551	18	Mexico	0.543	19	Mexico	0.563	21
Netherland	0.638	5	Netherland	0.655	4	Netherland	0.682	4
New Zealand	0.553	17	New Zealand	0.560	17	New Zealand	0.575	19
Norway	0.920	1	Norway	0.895	1	Norway	0.870	2
Poland	0.526	22	Poland	0.555	18	Poland	0.579	17
Portugal	0.447	28	Portugal	0.448	27	Portugal	0.464	28
Slovak Rep.	0.593	11	Slovak Rep.	0.596	10	Slovak Rep.	0.625	11
Slovenia	0.570	15	Slovenia	0.577	15	Slovenia	0.629	10

Spain	0.491	24	Spain	0.518	23	Spain	0.524	23
Sweden	0.597	10	Sweden	0.593	12	Sweden	0.597	15
Switzerland	0.602	9	Switzerland	0.639	7	Switzerland	0.673	6
Turkey	0.362	33	Turkey	0.324	33	Turkey	0.361	33
UK	0.381	31	UK	0.445	28	UK	0.412	30
USA	0.370	32	USA	0.357	32	USA	0.372	32

In the table below, all the periods of countries has been ranked from best foreign performance to worst.

Table 7: Final Ranking of countries between 1999 and 2014

Rank	Country	Score	Rank	Country	Score	Rank	Country	Score
1	Norway	38	13	Canada	217	25	Israel	366
2	Ireland	42	14	Czech Rep.	222	26	Poland	383
3	Germany	95	15	Hungary	252	27	Estonia	412
4	Denmark	133	16	Italy	257	28	Luxembourg	420
5	Netherland	139	17	Slovenia	284	29	Spain	430
6	Sweden	147	18	Slovak Rep.	285	30	UK	439
7	Chile	151	19	Austria	297	31	Portugal	472
8	Japan	163	20	Iceland	309	32	Turkey	478
9	Finland	185	21	Australia	313	33	USA	494
10	Korea Rep.	185	22	Mexico	321	34	Greece	515
11	Switzerland	185	23	New Zealand	328			
12	Belgium	210	24	France	353			

Conclusion

When all the period from 1999 to 2014 examined, the best performing country is Norway while the worst performing country is seen as Greece among OECD countries. The first five countries which have the best foreign trade performance are Norway, Ireland, Germany, Denmark and Netherlands subsequently and the last five countries which have the worst foreign performance are Greece, United States, Turkey, Portugal and United Kingdom subsequently.

Discussion

Investigating the economic performance of countries has received the the growing interest of researchers since 1990s. Most of the empirical research in this regard has focused on developing countries because of their structural weaknesses and instability. Understanding the foreign performance of OECD group of countries is more important for policy makers in the global context.

In this study, we perform TOPSIS method to evaluate benchmarking performance in OECD countries in international trade. The set of results suggest that the best performing country is Norway while the worst performing country in Greece over the 1999-2014 period. The worst three performers, Turkey, USA and Greece have undergone major financial crises

over the last 20 years which has led to the imposition of restrictive trade policies. The ongoing sovereign debt crisis in the EU has also the same impact not only on these countries but also some other worst performer OECD countries such as Spain, UK and Portugal (see table.7). The success of the best performing countries in international trade such as Norway, Ireland, Germany, Denmark and Netherland has been determined by their overall economic performance as well as foreign trade policies. The United States has relatively high tariffs and non-tariff trade barriers of imports from developing countries. As a whole, the restrictions have a great impact on trade balance which in turn ranking of the foreign trade performances. Furthermore, the existence of an asymmetry according to economic performance and trade barriers of the sampling countries should be noted. Beside these, USA and UK have been suffering from trade deficits almost for two decades because of their overvalued exchange rates and increasing consumer spending despite they are biggest economies of the world.

Implications

As it can be seen from findings, more productive and innovative countries are leaders in international trade. Especially, socioeconomic factors such as human rights, education system, health care and transparency of open state become prominent as so in Nordic countries, Ireland and Germany. For this reason, governments should give priority to develop socioeconomic welfare to constitute competitive economy.

This paper can be expanded by changing countries, periods and importance weights which are attached to criteria and the result which is acquired from TOPSİS analyze, may be controlled and supported by the other multivariate decision methods.

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