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Determining the Country with the Best Economic Conditions 2025 using the MCDM Method

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Abstract−In the midst of increasingly complex global challenges in 2025, evaluating a country's economic condition is an important element in supporting strategic decision-making, whether at the government, corporate or individual level. The diversity of economic indicators such as Gross Domestic Product (GDP), inflation, unemployment, and human development index often makes it difficult to make an objective and comprehensive assessment. Reliance on a single indicator tends to produce a biased and unrepresentative picture. To address these issues, this research adopts a Multi-Criteria Decision Making (MCDM) approach that is able to consider various economic aspects simultaneously and systematically. The three MCDM methods used in this study are TOPSIS, VIKOR, and COCOSO. The analysis was conducted on 19 countries using four main indicators, namely GDP in billion USD, inflation rate, unemployment rate, and economic growth rate. Based on the results of data processing, the USA occupies the top position as the country with the best economic performance, followed by China. The three methods show consistency in ranking some countries, but there are also striking differences for some alternatives due to different approaches in normalisation and weighting. These findings emphasise the importance of choosing the right method in multicriteria evaluation. Therefore, a combined approach such as ensemble decision-making is recommended to strengthen the validity of the results. For further development, the use of additional indicators and the integration of artificial intelligence-based technology are suggested to improve accuracy and flexibility in analysing economic conditions between countries.

Keywords: Multi-Criteria Decision Making (MCDM); Economic Performance Evaluation; TOPSIS Method; VIKOR Method; CoCoSo Method

1. INTRODUCTION

In an era of globalisation and increasingly complex economic dynamics, assessing the economic condition of a country is a crucial aspect of decision-making, whether at the government, corporate or individual level. The year 2025 brings a variety of new challenges and opportunities, including the continued impact of the global pandemic, geopolitical instability, and the acceleration of digital transformation that is changing the face of the world economy. The main problem faced in this context is how to objectively determine which countries have the best economic conditions amidst the diversity of economic indicators such as Gross Domestic Product (GDP), inflation rate, unemployment rate, human development index (HDI), and fiscal stability. Subjective assessment or the use of a single indicator often leads to bias and does not reflect the overall economic picture.

To overcome these problems, this research offers a Multi-Criteria Decision Making (MCDM)-based approach, a decision-making method that considers multiple criteria simultaneously and systematically[1]–[4]. MCDM allows for a more comprehensive evaluation by taking into account the weight of each economic indicator and making rational comparisons between countries. Several MCDM methods such as COCOSO[5][6][7], VIKOR[8][9] and TOPSIS[10][11] will be considered in this process to ensure the validity and reliability of the analysis results.

The main objective of this research is to identify and determine the countries with the best economic conditions in 2025 based on the latest and relevant quantitative data. In addition, this research also aims to develop a framework that can be reapplied in economic assessment across time and regions. The methodology applied includes the stages of collecting economic data from reliable sources, normalising and weighting the criteria, and applying the MCDM method to produce the final ranking of the analysed countries.

Alaa Fouad Momena, et al conducted research in 2024, this study addresses the complex challenges faced by supply chain companies (SCCs), including disruptions, logistics constraints, technological limitations, ethical sourcing, and demand-supply mismatches. To solve this, a structured Multi-Criteria Decision-Making (MCDM) approach was applied using the CRITIC method for weighting criteria and the MULTIMOORA method for ranking major e-commerce companies. Results showed that supply chain disruptions had the highest impact, followed by logistics and sustainability-related factors. Among the evaluated companies, Company C ranked highest in overall supply chain performance. The study contributes by offering a quantitative, criteria-weighted evaluation framework for SCCs and fills a GAP in the literature by integrating objective weighting (CRITIC) and robust ranking (MULTIMOORA) while highlighting the most influential challenges impacting supply chain adaptability[12].

Hoang Xuan Thinh, et al. in 2024 conducted a study that identified a problem in the MCDM (Multi-Criteria Decision-Making) method where the decision maker's opinion, which is influenced by the MCDM method, data normalisation, weighting, and user coefficients, has great potential to affect the ranking results of alternatives. As a solution, this research specifically investigates the influence of user opinions (through the criteria weighting method and user coefficients) on the ranking of alternatives using the CoCoSo (Combined Compromise Solution) method in the case study of copper power cable selection. The final results show that user opinions have little influence on the

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ranking of alternatives, even the best alternative (A16) remains consistent across different opinion scenarios, thus confirming the advantage of the CoCoSo method which is less sensitive to the subjectivity of decision makers[13].

Zhe Kan, et al in 2024 conducted a study, in the study explained that subsea pipelines that are crucial for offshore oil and gas transportation have potential hazards that need to be mitigated through effective risk assessment. This paper addresses the problems of uncertainty, hierarchical complexity, and lack of precision in multi-attribute risk assessment by proposing an extended FMEA-based comprehensive risk assessment model, combining grey relational projection method and compromise ranking method (GRP-VIKOR). The final results of applying this model to actual subsea pipeline data demonstrate its ability to accurately analyse risk priorities, providing effective theoretical support for improving subsea pipeline safety, albeit with notes of the need for expert expertise, real-time data updates, cost, and the dependence of the analysis environment on artificial intelligence. decision-maker subjectivity[14].

A 2024 study by Fatimah Azahra Imran and colleagues addressed the contemporary challenge of securing suitable and budget-friendly student housing. To tackle this issue, the researchers developed a Decision Support System (DSS) utilizing the TOPSIS method. This system aims to streamline the selection of ideal boarding houses by evaluating key factors like cost, proximity, amenities, safety, and hygiene to generate recommendations. Their findings indicated that Kost RT5 emerged as the top choice, achieving a preference score of 0.791. Furthermore, the system demonstrated a 93% accuracy rate after analyzing data from 20 different boarding houses[15].

The structure of this study is organised as follows: The first section discusses the background and urgency of the research; the second section outlines the literature review related to global economic conditions and the MCDM method; the third section describes the research methodology in detail; the fourth section presents the results and analysis; and the fifth section concludes the findings and provides recommendations for further research. It is hoped that the results of this study will not only contribute academically, but also become a practical reference for policy makers, investors, and researchers in understanding the dynamics of the global economy more objectively and measurably.

2. RESEARCH METHODOLOGY

2.1 Research Stages

The research process consists of a sequence of activities performed by researchers to generate new knowledge. These steps in research are depicted in the diagram below (Figure 1).

Figure 1. Research Stages

According to the diagram in Figure 1, the stages outlined above include several key processes. The first is problem analysis, an in-depth effort to systematically understand the root causes of the problem. The second is literature review, which involves examining, assessing, and integrating various relevant sources of reference related to the research topic. The third step is data collection, a structured approach to gathering the information necessary to address research questions or achieve specific objectives. This data may include numbers, text, or visuals from a variety of sources. The fourth stage involves comparative analysis of MCDM methods, which entails the communication and evaluation of various multi-criteria decision-making (MCDM) techniques. In this study, a comparison will be made among five MCDM methods: COCOSO, VIKOR, and TOPSIS. The final stage is the report, which presents the results of observations, research, or activities, either in written or oral form.

2.2 MCDM

Multi-Criteria Decision Making (MCDM) offers a structured approach to tackle complex decisions. When faced with multiple possible solutions, each evaluated based on various, sometimes conflicting, criteria, MCDM techniques provide a methodical way to identify the best choice. These approaches allow decision-makers to consider and balance a variety of factors rather than relying on just one measure, resulting in a more thorough and informed decision. MCDM essentially helps prioritize alternatives by evaluating several relevant attributes at once. The field includes a wide range of methods, each designed for different decision-making contexts. Choosing the right MCDM method depends on the nature of the problem, the characteristics of the criteria, and the decision-maker's preferences. Some well-known MCDM methods include SAW, WP, WASPAS, MOORA, ARAS, GADA, OCRA, MAUT, MOOSRA, PSI, AHP, ROC, EDAS, MABAC, COCOSO, VIKOR, TOPSIS, among others[16]–[21].

2.3 CoCoSo Method

The COCOSO (Combined Compromise Solution) method [22]–[25] is one of the techniques in Multi-Criteria Decision Making (MCDM) that integrates the compromise principle of several decision-making methods such as

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SAW (Simple Additive Weighting), WP (Weighted Product), and the compromise solution approach. The main objective of this method is to determine the best alternative through a comprehensive evaluation of all criteria assessed, both in terms of benefits and costs. The process starts by forming a decision matrix, which is then normalised based on the type of criteria. For benefit criteria, the normalisation process is carried out using the following equations 1 and 2.

$$\text{Benefit} : r_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}} \tag{1}$$

$$\text{Cost}: r_{ij} = \frac{\max x_{ij} - x_{ij}}{\max x_{ij} - \min x_{ij}} \tag{2}$$

The formula in equation one (1) is used for benefit-type attributes (criteria) while for cost-type criteria (non-benefit) can use the second equation formula (2). The next step is to calculate the aggregate value of each alternative. The linear aggregate value or known as the positive ideal solution (Si) is obtained from the sum of the normalised values that have been multiplied by the weight of each criterion which can be seen in the following equation formula 3:

$$S_i = \sum_{j=1}^{n} (W_j r_{ij}) \tag{3}$$

While the geometric aggregate value or known as the negative ideal solution (Pi) is calculated by summing the normalised values that have been raised according to their weights, the formula can be seen in the following equation 4:

$$P_i = \sum_{j=1}^{n} (r_{ij})^{w_j} \tag{4}$$

The third stage aims to calculate the relative weight of each alternative using aggregation techniques. This process involves three steps in the calculation of evaluation scores that produce relative weight values. The following is the formula used to determine the weight.

$$K_{ia} = \frac{S_i + P_i}{\sum_{i=1}^{m} (S_i + P_i)} \tag{5}$$

$$K_{ib} = \frac{S_i}{\min S_i} + \frac{P_i}{\min P_i} \tag{6}$$

$$K_{ic} = \frac{\lambda(S_i) + (1-\lambda)(P_i)}{(\lambda \max S_i + (1-\lambda) \max P_i)} \tag{7}$$

The Combined Compromise Solution (CoCoSo) method ends by calculating the total ki value for each alternative, using equation 8.

$$K_i = (k_{ia} k_{ib} k_{ic})^{\frac{1}{3}} + \frac{1}{3}(k_{ia} + k_{ib} + k_{ic}) \tag{8}$$

The alternative that has the highest Ki value is considered the best choice because it shows optimal proximity to the ideal solution from all three aggregation perspectives. The strength of the COCOSO method lies in its ability to bring together the strengths of the linear and multiplicative approaches in a balanced and flexible compromise framework.

2.3 VIKOR Method

The VIKOR method (VIseKriterijumska Optimizacija I Kompromisno Resenje)[26] is one of the techniques in Multi-Criteria Decision Making (MCDM) designed to assist decision-making by considering several conflicting criteria. The main objective of this method is to find the compromise solution that most closely approaches the ideal condition, taking into account both collective interests and the maximum dissatisfaction from each alternative. The stages in the VIKOR method begin with forming a decision matrix, which shows the performance of each alternative against all criteria. Then, a normalization process is carried out to ensure all data are on a comparable scale, and the normalization formula can be seen in the following equation 9.

$$f_{ij} \left(\frac{x_{ij}}{\sqrt{\sum_{i=1}^{n} (x_{ij})^2}} \right) \tag{9}$$

After normalization, the positive ideal value f_j^* and negative ideal value f_j^- are determined for each criterion. For benefit criteria, the positive ideal value is determined based on the maximum value from the normalized results f_{ij}, while the negative ideal value is determined based on the minimum value of the normalized results f_{ij}. For cost criteria, the opposite of the benefit criteria applies. The next step is to calculate two important indices, S_i and R_i, for each alternative. The value S_i reflects the total distance of an alternative from the ideal solution and is calculated using the following equation 10:

$$S_i = \sum_{j=1}^{n} W_j \left(\frac{f_j^* - f_{ij}}{f_j^* - f_j^-} \right) \tag{10}$$

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Meanwhile, R_i represents the maximum level of dissatisfaction of an alternative with respect to a specific criterion, and is calculated using the following equation 11:

$$R_i = Max \left[W_j \left(\frac{f_j^* - f_{ij}}{f_j^* - f_j^-}\right)\right] \quad (11)$$

Here, wj represents the weight of the j-th criterion, and f_{ij} is the value of the i-th alternative on the j-th criterion. Next, the compromise index value Q_i is calculated to determine the ranking of alternatives using the formula in equation 12 below:

$$Q_i = \left[\frac{S_i - S^-}{S^* - S^-}\right] V + \left[\frac{R_i - R^-}{R^* - R^-}\right] (1 - V) \quad (12)$$

Where S^* = Max S_i , S^- = min S_i dan R^* = Max R_i , R^- = Min R_i and V is a parameter that controls the balance between the majority rule strategy and the maximum dissatisfaction (typically set to v=0,5) Finally, the alternatives are ranked based on the Q_i values, and the alternative with the smallest value is considered the best compromise solution, provided it meets the conditions of consistency and solution stability.

2.3 TOPSIS Method

"The TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method [27][28] is one of the techniques in Multi-Criteria Decision Making (MCDM) used to determine the best alternative based on its relative closeness to the ideal solution. The process begins by constructing a decision matrix, which contains the values of each alternative with respect to each criterion and is denoted by X_{ij} where i represents the alternative and j represents the criterion. Subsequently, normalization is performed on this matrix using the vector normalization approach, according to equation 13.

$$rij = \frac{xij}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \quad (13)$$

The next step is to form the weighted decision matrix by multiplying the normalized values with the weight of each criterion, using equation 14.

$$y_{ij} = w_i * r_{ij} \quad (14)$$

Then, the positive ideal solution (A^+) and the negative ideal solution (A^-) are determined. The positive ideal solution represents the highest values for benefit criteria and the lowest values for cost criteria, while the negative ideal solution is the opposite.

$$A^+ = (y_1^+, y_2^+, \dots, y_n^+) \quad (15)$$

$$A^- = (y_1^-, y_2^-, \dots, y_n^-) \quad (16)$$

Equations 15 and 16 above can be adjusted based on predetermined conditions, including to find y_{ij}^+. If j is a benefit attribute, the maximum value is taken, but if j is a cost attribute, the minimum value is taken. Meanwhile, to determine the value of y_{ij}^-, the opposite of y_{ij}^+ is taken. After that, the distance between each alternative and the positive and negative ideal solutions is calculated using the Euclidean distance formulas, equations 17 and 18.

$$D_i^+ = \sqrt{\sum_{j=1}^{n} (y_{ij} - y_i^+)^2} \quad (17)$$

$$D_i^- = \sqrt{\sum_{j=1}^{n} (y_{ij} - y_i^-)^2} \quad (18)$$

The final step is to determine the relative preference value for each alternative using the following equation 19:

$$V_i = \frac{D_i^-}{D_i^- + D_i^+} \quad (19)$$

The higher the value of V_i, the closer that alternative is to the ideal condition, and the more feasible it is to be chosen. Thus, the TOPSIS method allows for decision-making based on the balance between closeness to the best solution and distance from the worst solution.

3. RESULTS AND DISCUSSION

This section will identify the countries with the best economic conditions in 2025 using the Multi-Criteria Decision Making (MCDM) method. The MCDM method was chosen due to its ability to evaluate and rank alternatives (in this case there are 19 countries) based on 4 indicators that will serve as relevant and often conflicting criteria. these indicators include Gross Domestic Product (GDP) in billion US Dollars, Inflation Rate in percentage, Unemployment

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Rate in percentage, and Economic Growth Rate in percentage. The selection of these four indicators is based on their relevance in reflecting the stability, capacity, and growth potential of a country's economy. To illustrate the initial data used in the MCDM analysis process, Table 1 presents a sample of projection data for the year 2025 of the 19 countries that are the focus of the study. This data will be normalised and further processed using the 3 selected MCDM methods to produce a comparative ranking of economic conditions between countries.

Table 1. Sample Economic Condition Projection Data for 19 Countries in 2025

Country	GDP (in billion USD)	Inflation Rate (%)	Unemployment Rate (%)	Economic Growth (%)
USA	22500	3,5	4,2	2,6
China	12000	2,8	5,4	3,8
Japan	7000	1,5	2,1	1,6
Germany	4800	4,9	3	2,6
India	3000	5	5,2	6,2
UK	3700	2,8	3,3	2,5
Canada	2250	2,8	5,4	2,5
Russia	2300	4,8	5,5	1,7
Australia	2050	2,9	4,6	2,7
France	3900	2,8	6,9	2,5
South Korea	1750	2,5	3	2,5
Saudi Arabia	646	5,4	10,5	0
Brazil	2600	3,3	7	2,6
Italy	5200	2	6,5	1
Bangladesh	250	5,5	4,5	7,9
Indonesia	1550	3	4,5	5
Turkey	6000	15	7	3
Malaysia	480	2	3,8	4,5
Pakistan	500	20	5	3,2

Table 1 shows the projected economic data for 19 countries around the world in 2025. The table presents four indicators, namely GDP (in billion USD) which describes the total market value of all goods and services produced in a country in one year. The United States is projected to have the highest GDP with $22,500 billion, followed by China with $12,000 billion and Japan with $7,000 billion. Bangladesh and Malaysia have relatively lower GDP projections. The Inflation Rate (%) indicator measures the rate of increase in the prices of goods and services in an economy over a period of time. Pakistan is projected to have the highest inflation rate of 20%, followed by Turkey with 15% and Saudi Arabia with 5.4%. Japan and Malaysia are projected to have the lowest inflation rates of 1.5% and 2% respectively. The third indicator is the Unemployment Rate (%) which shows the percentage of the labour force that is unemployed and actively seeking work. Saudi Arabia is projected to have the highest unemployment rate at 10.5%, followed by Brazil with 7% and Turkey with 7%. Japan has the lowest unemployment rate at 2.1%. The last indicator is Economic Growth (%) which measures the percentage change in a country's GDP from one period to the next, indicating the rate of economic expansion. Bangladesh is projected to have the highest economic growth rate of 7.9%, followed by India with 6.2% and Indonesia with 5%. Saudi Arabia is projected to have the lowest economic growth rate of 0%.

Overall, table 1 provides a comparative picture of the projected economic conditions for 19 countries in 2025 based on four key indicators. This data will form the basis for further analysis using the MCDM method in the study to determine the countries with the best economic conditions. Significant differences between countries in each indicator indicate variations in economic stability, capacity, and growth potential at the global level. Before applying the MCDM method, it is necessary to determine the level of importance of each criterion (determined based on indicators) and the type of criteria in order to facilitate the application of the MCDM method, more details can be seen in table 2 below.

Table 2. Assessment Criteria Table

Criteria	Describtion	Weight	Types of Criteria
C1	GDP (in billion USD)	0,35	Benefit
C2	Inflation Rate (%)	0,20	Cost
C3	Unemployment Rate (%)	0,15	Cost
C4	Economic Growth (%)	0,30	Benefit

Regarding the level of priority for each of the criteria determined in Table 2 above, GDP (in billion USD) is given a weight of 0.35 because economic size (GDP) is often considered a fundamental indicator of a country's economic strength and capacity. Countries with larger GDPs tend to have more resources for development and stability. Economic Growth (%) is given a weight of 0.30 on the grounds that economic growth indicates the future

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potential and dynamism of the economy. A high growth rate is often an indicator of bright economic prospects and increased prosperity in the future. While Inflation Rate (%) is given a weight of 0.20, while a low value is good, its impact may not be as great as the size or growth of the economy in determining the overall 'best' conditions. Unemployment Rate (%) given 0.15, While important for social welfare and stability, in the context of macro 'best economic conditions', the priority may be slightly lower compared to the size and growth of the economy.

For the type of criteria of the four criteria, benefit criteria are set for 2 indicators: GDP (in billion USD), the higher the GDP of a country, the larger the scale of its economy, which is generally considered a better economic condition. In addition, the Economic Growth (%) indicator, where higher economic growth rates indicate better economic development and potential. As for the cost criteria, there are 2 indicators, namely Inflation Rate (%), where a low or stable inflation rate is preferred because it maintains people's purchasing power and economic stability. High inflation can be detrimental. In addition, the Unemployment Rate (%) indicator, where a low unemployment rate indicates better utilisation of human resources and healthier socio-economic conditions. High unemployment is an indication of economic problems.

3.1 Results

After determining the level of importance or known as the weight of the criteria and also the type of criteria, then apply 3 MCDM methods namely COCOSO, VIKOR and TOPSIS so that a comparison of the final results obtained from each MCDM method will be seen. Berikut matriks keputusan dari data yang akan di gunakan dalam penelitian ini.

$$X_{ij} = \begin{bmatrix} 22500 & 3,5 & 4,2 & 2,6 \\ 12000 & 2,8 & 5,4 & 3,8 \\ 7000 & 1,5 & 2,1 & 1,6 \\ 4800 & 4,9 & 3 & 2,6 \\ \dots & \dots & \dots & \dots \\ 500 & 20 & 5 & 3,2 \end{bmatrix}$$

3.1.1 Implementation of the CoCoSo Method

In the application of the COCOSO method, there are 5 steps to be carried out in the decision-making process, starting from the formation of the decision matrix taken from Table 1 to calculating the combination of aggregate values and the final score calculation for each alternative that will be ranked. Based on the matrix X_{ij}, the next step of the CoCoSo method is to perform normalization to ensure that each value of X_{ij} has a comparable scale. The following is the normalization calculation for criterion C1 using equation 1 above.

$$r_{11} = \frac{22500-250}{22500-250} = \frac{22250}{22250} = 1$$

$$r_{21} = \frac{12000-250}{22500-250} = \frac{11750}{22250} = 0,528$$

For other benefit criteria such as C4, normalize the value of each alternative using the appropriate normalization method, as exemplified in the calculations of r_{11} and r_{21} for criterion C1 previously. Meanwhile, normalization for cost criteria, such as C2, is performed using equation 2.

$$r_{12} = \frac{20-3,5}{20-1,5} = \frac{16,5}{18,5} = 0,892$$

$$r_{22} = \frac{20-2,8}{20-1,5} = \frac{17,2}{18,5} = 0,930$$

For other cost criteria such as C3, normalize the value of each alternative using the appropriate normalization method, as exemplified in the calculations of r_{11} and r_{21} for criterion C2 previously. After the normalization process is applied to the initial data, the normalized matrix R_{ij}^* is generated, containing the adjusted performance values of alternatives for each criterion, all within a comparable scale. After normalization, the next step is to calculate the positive ideal solution (S_i) and the negative ideal solution (P_i) for each criterion using equations 3 and 4, as shown in the following example calculation.

$$S_1 = (0,35 * 1,000) + (0,20 * 0,892) + (0,15 * 0,750) + (0,30 * 0,329) = 0,740$$

$$S_2 = (0,35 * 0,528) + (0,20 * 0,930) + (0,15 * 0,607) + (0,30 * 0,481) = 0,606$$

Perform the calculation for finding the positive ideal solution for S_3 up to S_{19} following the same calculation method as for S_1 and S_2 shown above. The following is the search for the negative ideal solution (P_i) .

$$P_1 = (1,000^{0,35}) + (0,892^{0,20}) + (0,750^{0,15}) + (0,329^{0,30}) = 3,652$$

$$P_2 = (0,528^{0,35}) + (0,930^{0,20}) + (0,607^{0,15}) + (0,481^{0,30}) = 3,516$$

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Perform the calculation for finding the negative ideal solution for P_3 up to P_{19} following the same calculation method as for P_1 and P_2 shown above. After finding the positive ideal solution and the negative ideal solution for all alternatives, the resulting S_i and P_i values can be seen in Table 3 below.

Tabel 3. Values of Positive and Negative Ideal Solutions (Si and Pi)

Alternative	Si	Pi
1	0,740	3,652
2	0,606	3,516
3	0,517	3,278
4	0,467	3,234
…	…	…
19	0,224	1,909

After determining the positive and negative ideal solutions, based on Table 3 above, we will calculate the relative weight using the first aggregation technique, which is the calculation according to equation 5. Here is an example of the calculation:.

$$K_{1a} = \frac{0{,}740+3{,}652}{65{,}053} = \frac{4{,}391}{65{,}053} = 0{,}068$$

$$K_{2a} = \frac{0{,}606+3{,}516}{65{,}053} = \frac{4{,}122}{65{,}053} = 0{,}063$$

Perform the calculation for finding the relative weight for K_{3a} up to K_{19a}. After calculating the relative weight for K_{ia} (all alternatives), the next step is to find the relative weight for K_{ib} using equation 6. The example calculation is as follows

$$K_{1b} = \frac{0{,}740}{0{,}164} + \frac{3{,}652}{1{,}198} = 7{,}556$$

$$K_{2b} = \frac{0{,}606}{0{,}164} + \frac{3{,}516}{1{,}198} = 6{,}630$$

Perform the calculation for finding the relative weight for K_{3b} up to K_{19b}. After calculating the relative weight for K_{ib} (all alternatives), the next step is to find the relative weight for K_{ic} using equation 7 with the lambda value (λ) in this research being 0.5. The following is an example calculation for this relative weight

$$K_{1c} = \frac{0{,}5(0{,}740)+(1-0{,}5)(3{,}652)}{(0{,}5*0{,}740+(1-0{,}5)*3{,}652)} = 1{,}000$$

$$K_{2c} = \frac{0{,}5(0{,}606)+(1-0{,}5)(3{,}516)}{(0{,}5*0{,}740+(1-0{,}5)*3{,}652)} = 0{,}939$$

Perform the calculation for finding the relative weight for K_{3c} up to K_{19c}. After calculating the relative weight for K_{ic} (all alternatives), the following is Table 4, which shows the Results of Relative Weight Calculations for K_{ia}, K_{ib}, and K_{ic}.

Table 4. Results of Relative Weight Calculation for Alternatives K_{ia}, K_{ib}, and K_{ic}

Alternatif	K_{ia}		K_{ib}		K_{ic}	
	K	Rank	K	Rank	K	Rank
1	0,068	1	7,556	1	1,000	1
2	0,063	2	6,630	2	0,939	2
3	0,058	4	5,887	4	0,864	4
4	0,057	5	5,549	7	0,843	5
…	…	…	…	…	…	…
19	0,033	18	2,957	18	0,486	18

After determining the relative weights K_{ia}, K_{ib}, and K_{ic} as shown in Table 4 above, the next step is to calculate the total value K_i obtained from these three relative weights according to equation 8. The following is an example of the calculation:

$$K_1 = (k_{1a}k_{1b}k_{1c})^{\frac{1}{3}} + \frac{1}{3}(k_{1a}+k_{1b}+k_{1c}) = (0{,}068*7{,}556*1{,}000)^{\frac{1}{3}} + \frac{1}{3}(0{,}068+7{,}556+1{,}000) = 3{,}674$$

$$K_2 = (k_{2a}k_{2b}k_{2c})^{\frac{1}{3}} + \frac{1}{3}(k_{2a}+k_{2b}+k_{2c}) = (0{,}063*6{,}630*0{,}939)^{\frac{1}{3}} + \frac{1}{3}(0{,}063+6{,}630+0{,}939) = 3{,}277$$

Perform the calculation for finding the K_i values from K_3 to K_{19} following the same process as the calculation of K_1 and K_2 above. After calculating all K_i values, the final results can be seen in Table 5 below, along with the ranking of each alternative.

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Tabel 5. Calculation Results K_i

Alternative	K_i	Rank
K1	3,674	1
K2	3,277	2
K3	2,937	4
K4	2,793	7
...	...	...
K19	1,519	18

Table 5 presents the final results obtained using the COCOSO method. It shows that the first alternative is identified as the country with the best economic condition, which is the USA, followed by CHINA, with scores of 3.674 for the USA and 3.277 for CHINA, respectively.

3.1.2 Application of the VIKOR Method

In the application of the VIKOR method, there are 4 main steps: performing normalization up to finding the compromise index. Given that the decision matrix X_{ij} has already been formed, the next step in the VIKOR method is to perform normalization to ensure that each value of X_{ij} has a comparable scale. The following is the normalization calculation for the criteria using equation 9 above.

$$f_{11}\left(\frac{22500}{29171{,}394}\right) = 0{,}771$$

$$f_{21}\left(\frac{12000}{29171{,}394}\right) = 0{,}411$$

Perform the normalization for each criterion, similar to the calculation of f_{11} and f_{21} for criterion C1 above. After normalization, the positive ideal value (f_j^*) and the negative ideal value (f_j^-) are determined for each criterion. For criterion C1, the value of f_1^* is 0.771 and the value of f_1^- is 0.052. For criteria C2 through C4, adjust according to the provisions explained previously. The next step is to calculate two important indices, S_i and R_i, for each alternative. An example calculation of the S_i value using equation 10 is as follows:".

$$S_1 = \left(0{,}35\left(\frac{0{,}771-0{,}771}{0{,}771-0{,}009}\right)\right) + \left(0{,}2\left(\frac{0{,}052-0{,}120}{0{,}052-0{,}688}\right)\right) + \left(0{,}15\left(\frac{0{,}088-0{,}177}{0{,}088-0{,}441}\right)\right) + \left(0{,}30\left(\frac{0{,}511-0{,}168}{0{,}511-0{,}000}\right)\right) = 0{,}260$$

$$S_2 = \left(0{,}35\left(\frac{0{,}771-0{,}411}{0{,}771-0{,}009}\right)\right) + \left(0{,}2\left(\frac{0{,}052-0{,}096}{0{,}052-0{,}688}\right)\right) + \left(0{,}15\left(\frac{0{,}088-0{,}227}{0{,}088-0{,}441}\right)\right) + \left(0{,}30\left(\frac{0{,}511-0{,}246}{0{,}511-0{,}000}\right)\right) = 0{,}394$$

Perform the calculation for finding S_3 up to S_{19} following the same calculation method as for S_1 and S_2 shown above. The following is the calculation for R_i using equation 11.

$$R_1 = Max\left[\left(0{,}35\left(\frac{0{,}771-0{,}771}{0{,}771-0{,}009}\right)\right); \left(0{,}2\left(\frac{0{,}052-0{,}120}{0{,}052-0{,}688}\right)\right); \left(0{,}15\left(\frac{0{,}088-0{,}177}{0{,}088-0{,}441}\right)\right); \left(0{,}30\left(\frac{0{,}511-0{,}168}{0{,}511-0{,}000}\right)\right)\right] = 0{,}201$$

$$R_2 = Max\left[\left(0{,}35\left(\frac{0{,}771-0{,}411}{0{,}771-0{,}009}\right)\right); \left(0{,}2\left(\frac{0{,}052-0{,}096}{0{,}052-0{,}688}\right)\right); \left(0{,}15\left(\frac{0{,}088-0{,}227}{0{,}088-0{,}441}\right)\right); \left(0{,}30\left(\frac{0{,}511-0{,}246}{0{,}511-0{,}000}\right)\right)\right] = 0{,}165$$

Perform the calculation for finding R_i for alternatives 3 to 19, following the same method used for R_1 and R_2 above. The following is the calculation for the compromise index Q_i using equation 12.

$$Q_1 = \left[\frac{0{,}26-0{,}26}{0{,}836-0{,}260}\right] * 0{,}5 + \left[\frac{0{,}201-0{,}165}{0{,}350-0{,}165}\right](1-0{,}5) = 0{,}098$$

$$Q_2 = \left[\frac{0{,}394-0{,}26}{0{,}836-0{,}260}\right] * 0{,}5 + \left[\frac{0{,}165-0{,}165}{0{,}350-0{,}165}\right](1-0{,}5) = 0{,}116$$

Perform the calculation for finding the Qi values from Q3 to Q19 following the same process as the calculation of Q_1 and Q_2 above. After calculating all Q_i values, the final results can be seen in Table 6 below, along with the ranking of each alternative.

Tabel 6. Calculation Results Q_i

Alternative	Q_i	Rank
Q1	0,098	1
Q2	0,116	2
Q3	0,406	3
Q4	0,543	4
...	...	...
Q19	0,938	18

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Table 6 presents the final results obtained using the VIKOR method. It shows that the first alternative is identified as the country with the best economic condition because, in determining the best alternative, the lowest final value is preferred. The USA has the lowest value (0.098), followed by CHINA (0.116).

3.1.3 Application of the TOPSIS Method

In the application of the TOPSIS method, there are 5 main steps, performing normalization up to finding the preference value. Given that the decision matrix X_{ij} has already been formed, the next step in the TOPSIS method is to perform normalization to ensure that each value of X_{ij} has a comparable scale. The following is the normalization calculation for the criteria using equation 13 above.

$$r_{11} = \frac{22500}{29171{,}394} = 0{,}771$$

$$r_{21} = \frac{12000}{29171{,}394} = 0{,}411$$

The normalization above represents data 1 and data 2 for criterion C1. Perform normalization calculations on all data samples for criteria C1 through C4, following the same method as the calculation of r_{11} to r_{21} above. After calculating all criteria, the next step is to calculate the Y matrix by multiplying the R_{ij} results with the criteria weights that have been determined in Table 2. The calculation of Y can use equation 14.

$$y_{11} = w_1 . r_{11} = (0.35)\,.(0{,}771) = 0{,}270$$

$$y_{21} = w_1 . r_{21} = (0.35)\,.(0{,}411) = 0.144$$

Perform the calculation of Y_{ij} from y_{31} to $y_{19,4}$ following the same method as the calculation of y_{11} and y_{21} above. After calculating the total value of Y_{ij}, the next step is to find the positive ideal solution (A^+) using equation 15 and the negative ideal solution (A^-) using equation 16.

$$y_1^+ = \max \left\{ \begin{matrix} 0{,}270; 0{,}144; 0{,}084; 0{,}058; 0{,}036; 0{,}044; 0{,}027; 0{,}028; 0{,}025; 0{,}047; 0{,}021; 0{,}008; 0{,}031; 0{,}062; \\ 0{,}003; 0{,}019; 0{,}072; 0{,}006; 0{,}006 \end{matrix} \right\} = 0{,}270$$

$$y_1^- = \min \left\{ \begin{matrix} 0{,}270; 0{,}144; 0{,}084; 0{,}058; 0{,}036; 0{,}044; 0{,}027; 0{,}028; 0{,}025; 0{,}047; 0{,}021; 0{,}008; 0{,}031; 0{,}062; \\ 0{,}003; 0{,}019; 0{,}072; 0{,}006; 0{,}006 \end{matrix} \right\} = 0{,}003$$

Perform a search for positive ideal solutions (A^+) for y_1^+ to y_4^+ and negative ideal solutions (A^-) for y_1^- to y_4^- such as $A^+=(y_1^+,y_2^+,y_3^+,y_4^+)$ and $A^-=(y_1^-,y_2^-,y_3^-,y_4^-)$ above (positive and negative ideal solutions). After the search is carried out, the results of A^+ are {0.270; 0.010; 0.013; 0.153} and A^- are {0.003; 0.138; 0.066; 0.000}. The next step is to find the distance between alternatives and the positive and negative ideal solutions using equations 17 and 18.

$$D_1^+ = \sqrt{\textstyle\sum_{j=1}^{5}((y_{11} - y_1^+)^2 + (y_{12} - y_2^+)^2 + (y_{13} - y_3^+)^2 + (y_{14} - y_4^+)^2} = \sqrt{((0{,}270 - 0{,}270)^2 + (0{,}024 - 0{,}010)^2 + (0{,}026 - 0{,}013)^2 + (0{,}050 - 0{,}153)^2} = 0{,}105$$

$$D_1^- = \sqrt{\textstyle\sum_{j=1}^{2}((y_{11} - y_1^-)^2 + (y_{12} - y_2^-)^2 + (y_{13} - y_3^-)^2 + (y_{14} - y_4^-)^2 + (y_{15} - y_5^-)^2)} = \sqrt{((0{,}270 - 0{,}003)^2 + (0{,}024 - 0{,}138)^2 + (0{,}026 - 0{,}066)^2 + (0{,}050 - 0{,}000)^2} = 0{,}297$$

Perform the calculation of the distance search between each alternative and the positive ideal solution (D_i^+) for i=1 to 19, similar to the calculation of D_1^+ above. Also, perform the calculation of the distance search between each alternative and the negative ideal solution (D_i^-) for i=1 to 19, similar to the calculation of D_1^- above. After calculating these distances for all alternatives, the next step is to calculate the preference value (V_i) using equation 19 as follows:

$$V_1 = \frac{D_1^-}{D_1^- + D_1^+} = \frac{0{,}297}{0{,}297+0{,}105} = \frac{0{,}297}{0{,}402} = 0{,}740$$

$$V_2 = \frac{D_2^-}{D_2^- + D_2^+} = \frac{0{,}201}{0{,}201+0{,}151} = \frac{0{,}201}{0{,}352} = 0{,}571$$

Perform preference calculations for V_3 to V_{19} following the same method as the preference calculations for V_1 and V_2 above. After calculating all preference values, the following Table 7 contains the final results along with the ranking of each alternative.

Tabel 7. Calculation Results V_i

Alternative	V_i	Rank
V1	0,740	1
V2	0,571	2
V3	0,423	3

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Alternative	V_i	Rank
V4	0,365	8
...	...	...
V19	0,188	19

Table 7 presents the final results obtained using the TOPSIS method. It shows that the first alternative is identified as the country with the best economic condition, which is the USA, followed by CHINA, with preference values of 0.740 for the USA and 0.571 for CHINA, respectively..

3.2 Discussion

In an effort to understand the differences and similarities between the 3 MCDM methods used, a comparative analysis was conducted on the final results produced by each method. The main focus of this analysis is on the ranking order produced by each method. By comparing the ranking of one method with another, we can identify patterns of similarities or differences in the resulting decision making. The final results of the calculation of the 3 methods, figure 2 includes the ranking order of countries based on each method. This figure allows us to directly compare and analyse the results of each method side by side.

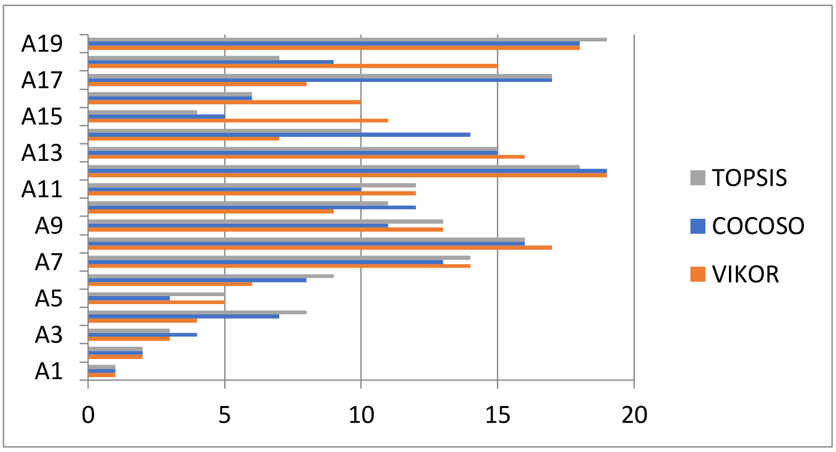

Figure 2. Comparative Analysis of MCDM Methods

Figure 2 above illustrates that the three methods yield relatively similar ranking patterns for several alternatives, such as A1, A2, and A19, which consistently occupy extreme positions at either the top or the bottom. This indicates a consistency in the performance evaluation of these alternatives across the three methods. However, there are also some notable differences for specific alternatives. For instance, A3 receives a high ranking in the TOPSIS and VIKOR methods but is ranked slightly lower in COCOSO, while A15 shows significant variation, likely due to sensitivity to the weights or the normalization method used. The differences in ranking results generated by TOPSIS, COCOSO, and VIKOR highlight the importance of method selection in the multi-criteria decision-making process. Although all three are frequently used for compromise-based decision-making to find final solutions, they have different approaches in processing data. TOPSIS focuses on the distance to the positive and negative ideal solutions, COCOSO is a hybrid method that combines elements of compromise and aggregation methods, and VIKOR is oriented towards a compromise solution that acknowledges inconsistencies between criteria.

Based on this comparative analysis, it is recommended to use a triangulation of results or ensemble decision-making approach in critical situations to enhance the validity of the decisions. Furthermore, sensitivity analysis on the weights and method parameters can be conducted to assess the stability of the obtained results.

4. CONCLUSIONS

Based on the results of the research conducted, it can be concluded that the Multi-Criteria Decision Making (MCDM) approach makes a significant contribution in assessing and comparing the economic conditions of countries more objectively and comprehensively. In the era of an increasingly complex global economy in 2025, the use of a single economic indicator is no longer sufficient to fully describe a country's economic situation. Therefore, this study combines four key indicators-Gross Domestic Product (GDP), inflation rate, unemployment rate, and economic growth rate, to provide a more balanced picture of a country's economic stability and prospects. The three MCDM methods used, namely TOPSIS, VIKOR, and COCOSO, demonstrated their respective capabilities in producing reliable rankings. In general, all three showed consistency in placing countries such as the USA and China at the highest position, indicating congruence in evaluation between methods. However, the differences in the rankings of certain countries, such as Japan and Bangladesh, also indicate sensitivity to the normalisation method and criteria weights used. This emphasises the importance of selecting an MCDM method that is appropriate to the context and

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purpose of the analysis. This research not only succeeded in identifying the countries with the best economic conditions in 2025, but also proposed an evaluation framework that can be reapplied in the future. As a strengthening step, the use of triangulation or ensemble decision-making approaches is suggested to combine the advantages of each method and improve the validity of the results. In addition, sensitivity analyses of the method weights and parameters are important to ensure the stability of the results. For future research, the exploration of additional indicators and the application of artificial intelligence or machine learning-based approaches could be relevant and potential development directions.

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