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AN ASSESSMENT OF THE POTENTIAL OF ARTIFICIAL INTELLIGENCE APPLICATIONS FOR SUSTAINABLE DEVELOPMENT IN SOUTHEASTERN EUROPEAN COUNTRIES

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Artificial Intelligence (AI) has become a key factor in the development of countries. Countries have recognized the potential of using AI to achieve sustainable development. This research explores the potential of the Southeast European (SEE) countries in the field of AI applications. The Government AI Readiness Index, with its nine indicators, is used to assess readiness for AI applications. A comparison of the SEE countries for the application of AI was conducted using Multi-Criteria Decision Making (MCDM) methods. The methods used were MEREC (Method based on the Removal Effects of Criteria) and CORASO (COmpromise Ranking from Alternative SOlutions). The results of the MEREC method show that the maturity and adaptability indicators have higher weight values compared to the other ones. The results of the CORASO method show that Greece and Bulgaria have the strongest indicators, with the sensitivity analysis confirming these findings.

Keywords: artificial intelligence, sustainable development, Government AI Readiness Index, MCDM, MEREC, CORASO

JEL Classification: F01, Q01, C02, O33

INTRODUCTION

Digital technologies and modern solutions increasingly influence the functioning of countries' economies (Adeyinka, 2023). Among these solutions, there is an increasing focus on developing artificial intelligence (AI) (Kuyoro, Fatade & Onuiri, 2025). Research is increasingly focused on developing new solutions and applying AI in real-world use. AI helps all segments of society and is becoming a key factor in digitalization processes (Peterka & Stroukal, 2024). AI has a wide range of applications and is reflected in processes automation, data analysis, and resource

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optimization, and can be used in the sustainable development of countries (Dabic-Miletic, 2024). Based on this, many countries are developing strategies so as to incorporate the application of AI in various sectors in order to leverage its benefits.

The Southeastern Europe (SEE) countries are facing digital transformations and the development of AI in all segments (Hristozov & Nozharov, 2024). However, for this to be applied in these countries, they must be ready to implement AI solutions. Their readiness for this is examined in terms of the development of their administration, technology, and infrastructure (Borissov & Hristozov, 2024). These are the key aspects that the SEE countries need to have. It is characteristic of the SEE countries that these segments are not developed to the same extent, so some countries are ahead of the others. Therefore, it is necessary to consider the advantages and limitations of the SEE countries when applying AI solutions is concerned.

Resource management is one of the key functions of AI in support of a country's sustainable development. AI-based resource management should be organized in a way to achieve sustainable development (Sarfraz, 2024), with the focus on environmental preservation, simultaneously improving the quality of life for the population. AI can play a significant role in the sustainable development of countries, making it necessary to capitalize on this opportunity (Lipianina-Honcharenko, Komar, Melnyk & Komarnytsky, 2024). The successful integration of AI depends on the relationship among government institutions, academic institutions, and the private sector (Purwanto, 2024). It is necessary to involve all relevant institutions in order to capitalize on the opportunities for applying AI in a country's development (Kaur, Kumar, Singh & Huang, 2024).

Different approaches have been developed to assess a country's readiness to use AI. The Government AI Readiness Index (2024) is one possible approach. This index consists of 40 indicators grouped into the three main categories: government, technology and data, and infrastructure. It highlights a country's readiness to adopt and use AI and can also identify gaps in these countries. Using the indicators contained in this index provides valuable data that can be used to develop strategies for integrating AI solutions in the SEE countries.

Digital transformation and the application of AI are becoming essential tools for improving countries' competitiveness and sustainable development (Driss, Dafri & Zouaoui, 2024). The SEE countries are facing various challenges they must address. AI can assist with this, but it is also necessary to modernize the public sector, education, and various economic sectors (Popescu, 2024). The question arises as to the level of the readiness of these countries to adopt AI in public administration, only to be followed by other sectors within these countries. The report entitled "The Government AI Readiness Index for 2024" (2024) gives the answer to the question of the SEE countries' capacity in terms of AI application. Based on the indicators presented in this report, a deeper analysis will be conducted in order to identify how AI can contribute to the achievement of sustainable development in the SEE countries. This study aims to link AI with sustainable development, which serves as the motivation for this research. The primary objective of this research is to assess the readiness of the SEE countries to implement AI for sustainable development, using the indicators of the Government AI Readiness Index for 2024 and the Multi-Criteria Decision Making (MCDM) method. Based on this research objective, specific research objectives are defined, intending to:

- identify the indicators for assessing the readiness of the SEE countries to implement AI from the Government AI Readiness Index report,
- compare the indicators of the SEE countries in terms of their capacities for AI implementation, especially in public administration,
- determine the importance of the indicators for the SEE countries' readiness to implement AI using the MEREC (MEthod based on the Removal Effects of Criteria) method,
- rank the SEE countries according to their potential for AI implementation using the CORASO (COmpromise Ranking from Alternative SOlutions) method,

- provide recommendations on how the SEE countries can achieve sustainable development through the use of AI.

This research makes multiple contributions, which are first reflected in the theoretical connection between AI and the sustainable development of the SEE countries. Then, it helps determine the potential and readiness of the SEE countries to implement AI, which will be achieved through the methodological framework that represents yet another contribution of this research. Additionally, it provides the current picture of the SEE countries in terms of their readiness to implement AI, based on which guidelines are given on how to enhance the countries' readiness to implement AI and advance their sustainable development.

LITERATURE REVIEW

AI is driving innovation across various sectors, enabling more efficient decision-making (Rajagopal, Qureshi, Durga, Ramirez Asis, Huerta Soto, Gupta & Deepak, 2022) and resource optimization (Wang, Deng, Zhou & Wu, 2023) and improving the quality of life (Olawade, David-Olawade, Wada, Asaolu, Adereni & Ling, 2024). Its applications range from economic and social aspects to environmental initiatives aimed at fostering sustainable development (Kulkov, Kulkova, Rohrbeck, Menvielle, Kaartemo & Makkonen, 2023). AI can contribute to all the dimensions of sustainable development: economic performance (through automation and productivity improvements (Mathew, Brintha & Jappes, 2023), improving the quality of life (through better services in healthcare (Aminizadeh, Heidari, Dehghan, Toumaj, Rezaei, Navimipour, Stroppa & Unal, 2024) and education (Srinivasa, Kurni & Saritha, 2022), as well as environmental sustainability (through energy optimization (Fan, Yan & Wen, 2023) and waste reduction (Onyeaka, Tamasiga, Nwauzoma, Miri, Juliet, Nwaiwu & Akinsemolu, 2023).

In the SEE, which is facing economic convergence and technological modernization challenges, AI represents an opportunity to accelerate development (Bazhal, 2022). However, the degree of the implementation of AI solutions depends on several factors, including institutional capacities, regulatory frameworks, and digitalization levels (Shostak, Lipych, Anatolii, Volynets, Andrew & Morokhova, 2024). Therefore, it is crucial to analyze how ready the SEE governments are to adopt AI technologies and how this affects their sustainable growth. One of the most relevant indicators for assessing a government's readiness for AI is the "Government AI Readiness Index" (Nzobonimpa & Savard, 2023; Nasution, Elveny, Pamucar, Popovic & Andrić Gušavac, 2024). This index evaluates a country's ability to develop, implement, and use AI technologies so as to foster social and economic development. For the SEE, this index can provide an insight into the strengths and weaknesses of individual governments in terms of AI strategies.

Whether a country is ready to implement AI technologies or not requires a systematic approach based on objective indicators (Myllyaho, Raatikainen, Männistö, Mikkonen & Nurminen, 2021; Kar, Choudhary & Singh, 2022). In addition to national strategies, it is vital to consider the role of regional and international initiatives, such as the EU Digital and AI Program, which can accelerate the development of AI systems in the SEE. The connection with the EU funds and regulatory frameworks can significantly impact the implementation of AI technologies in this region. A comparative analysis based on the "Government AI Readiness Index" can indicate specific areas in which improvements are needed in order to make AI a tool for sustainable growth.

In this context, MCDM methods effectively evaluate complex phenomena, such as AI readiness. In various research studies, the MEREC method has been used to identify the importance of indicators (Keshavarz-Ghorabaee, Amiri, Zavadskas, Turskis & Antucheviciene, 2021), which is particularly useful in the analyses which require crucial reliance on objective data in order to obtain objective weights for indicators. On the other hand, the CORASO method enables the precise ranking of alternatives based on their proximity to the best or the worst values for specific indicators. It calculates the deviation of each alternative from the best or the worst values and determines the final ranking (Puška, Nedeljković, Božanić, Štilić & Muhsen, 2024). A combined application of these methods can contribute to a comprehensive analysis of the readiness of the SEE countries to adopt AI technologies.

The following section provides a brief review of several studies in which the Government AI Readiness Index was used. A study by H. Amin Mohamed (2024) examined how prepared countries were to adopt AI to boost economic growth. The results of this study showed that the level of the readiness of countries to implement AI affected economic growth, particularly through improvements in public services and the enhanced productivity of government agencies. S. Ahangama and S. Krishnan (2023) investigated the relationship between e-participation and readiness to implement AI concerning citizens' well-being. The study demonstrated that readiness to implement AI had a positive impact on enhancing living standards through a more efficient use of technology, particularly in the context of AI. M. Alfadhli, N. C. Onat, M. Kucukvar and S. Al-Maadeed (2025) analyzed the readiness of countries to implement AI, with the focus on digital transformation. In their study, they concluded that there was significant room for improving AI application in practice. A. Socol and I. C. Iuga (2024) analyzed the impact of readiness to implement AI in the EU countries and its effect on brain drain. This research showed that wherever there was a greater brain drain in the EU countries, it negatively impacted the country's ability to implement AI. Therefore, it was necessary to retain ITC experts to improve readiness for AI implementation, which would have an influence on the economic development of those countries.

H. M. Tun, L. Naing, O. A. Malik and H. A. Rahman (2025) examined the readiness of the ASEAN countries to implement AI in healthcare. Using the indicators from the Government AI Readiness Index, they demonstrated that significant differences existed between the observed countries. Singapore showed the best results, whereas countries such as Cambodia and Myanmar lagged due to the underdeveloped infrastructure and noncompliance with the regulatory frameworks for AI implementation in healthcare. L. Shonhe and M. Kolobe (2023) used this index to study Botswana's readiness to implement AI. This research identified shortcomings in the country's development strategies, as well as its infrastructure and human resources. According to them, Botswana needed to make more effective plans and investments in digital transformation, particularly for AI implementation.

S. Nzobonimpa and J. Savard (2023) examined the relationship between the potential for AI implementation and innovation. The results of this study showed that, although there was a high level of technical readiness to implement AI, this did not mean that AI would be used responsibly. Still, the principles of transparency and ethics are essential for AI to make a meaningful contribution to a country's development. M. K. M. Nasution *et al* (2024) examined the Government AI Readiness Index methodology, offering alternative approaches to classifying countries. The application of this classification leads to better results in terms of countries' readiness to implement AI. The literature to date suggests that AI has the potential to contribute to sustainable development (Mariani, Machado, Magrelli & Dwivedi, 2023; Verdecchia, Sallou & Cruz, 2023). However, its implementation varies depending on the political priorities, technological capacities, and institutional readiness of each country (Afolabi, 2023).

This paper attempts to contribute to the understanding of the potential for AI implementation in the SEE countries by combining the "Government AI Readiness Index" with the MCDM methods, which will determine which SEE countries have the greatest potential for artificial intelligence application and provide the guidelines on what these countries need to improve in order to apply AI. The results are expected to contribute to a better understanding of the potential of AI in the SEE countries, enabling these countries to achieve sustainable growth and development. The reason for initiating this research lies in the fact that the SEE countries have not been studied separately to date. In addition, observing these countries provides an insight into how the EU member states and EU accession candidate countries can leverage the potential application of AI, which will help identify how the candidate countries can improve themselves so as to avoid falling behind the EU member states in the AI application potential.

METHODOLOGY AND RESEARCH METHODS

This research used the Government AI Readiness Index report to assess the countries' readiness to implement AI. Recognized by the leading global organizations, such as UNESCO and the G20, this report has become the key reference in the field. Therefore, it is used as a reliable and recognizable source to assess how institutions and countries are prepared to apply AI. The 2024 edition evaluated 188 countries, measuring their preparedness for AI adoption. This assessment is particularly relevant given AI's growing role in national development. Additionally, this index assesses AI's capacity to improve public services and contribute to national development. Moreover, economic uncertainty, climate change, and inequality have made AI adoption increasingly important for governments seeking improved outcomes.

The Government AI Readiness Index report distinguishes three dimensions: Government, Technology, and Data and Infrastructure, each being divided into three indicators, each indicator being further clarified with forty additional dimensions. These indicators were selected in order to ensure the consistency of the data related to the potential of AI applications in individual countries. The report summarizes all the dimensions into nine indicators grouped into three main categories. Each indicator includes additional dimensions as part of its structure. Selecting these nine indicators in this way ensures data accuracy, simultaneously preserving the value of all the dimensions and maintaining the representativeness of the data. Additionally, these nine indicators provide a more detailed explanation of countries' readiness to adopt AI in relation to the three main categories. However, if all 40 dimensions were observed, the data would be too scattered, and some dimensions would not have a significant impact, while the others would have a greater impact. Moreover, the individual impact of a large number of dimensions is smaller than when there are fewer dimensions, for which reason nine indicators were selected, not three main categories or all 40 dimensions. In this way, the values of these indicators are relevant for countries to adopt the policies that improve the conditions for AI applications. The indicators used are as follows:

- data representativeness (C1), which shows how many countries have helpful data on AI application and development. If the data are not representative, country analyses can be debatable. Therefore, data on AI solutions development in a single country must be unbiased.
- data availability (C2), which shows how easy it is to access data on AI development and how open these data are for a broader use. If data are available, they enable faster AI development and foster innovation. Open data enable cooperation between the public and private sectors.
- infrastructure (C3), which shows the availability of the information technology (IT) infrastructure and a country's technological development. A lack of infrastructure can significantly jeopardize AI implementation.
- human capital (C4), which refers to the availability of AI experts. A country needs to invest in the education of the personnel required for AI implementation. A lack of these personnel can slow down AI implementation.
- the innovation capability (C5), which is reflected in the application and development of new technologies and solutions. To encourage innovative activities, cooperation between the academic community, business entities, and the public sector is necessary. The countries that enable innovative activities are better able to apply AI technologies.
- maturity (C6), which refers to the level at which a particular country is in AI implementation. This includes the existence of the legal bases and research institutions that will increase AI application. The higher the maturity level of a state, the more willing it is to apply AI solutions.

- adaptability (C7), which measures a state's ability to adapt to new trends in the AI industry. Greater flexibility enables countries to adopt new AI solutions more quickly, increasing their own competitiveness.
- the digital capability (C8), which refers to the general digital infrastructure, new digital literacy, and the use of digital technologies. The widespread application of these technologies facilitates the implementation of AI solutions and increases a country's efficiency. Countries with a higher level of digital capacity adopt technological innovations, including AI application, more efficiently and faster.
- governance and ethics (C9), which show the existence of the legal frameworks for the ethical use of AI technologies. It is necessary to define how AI solutions are reliably and transparently applied. This reduces the risk of the misuse of AI applications. Clear ethical standards are essential for building trust in AI solutions and ensuring their sustainable use.

Each SEE country is assessed based on these indicators and the scores listed in the 2024 Government AI Readiness Index. A combination of the MCDM methods, namely MEREC and CORASO, are used to examine which SEE countries have the best indicators based on this report. The MEREC method determines the importance of these indicators, while the CORASO method ranks the SEE countries based on these indicators. In this study, the importance of the indicators is first determined using the MEREC method, which objectively determines weights using the indicators of the observed SEE countries. This method was developed by M. Keshavarz-Ghorabaee *et al* (2021), and includes the following steps:

Step 1. Forming a decision matrix.

Step 2. Data normalization. Since all indicators should have higher scores, the following normalization is applied:

$$n_{ij} = \frac{x_{ij}}{\max x_j}\text{; for the benefit indicators} \quad (1)$$

$x_{j\,max}$ - the maximum value of the indicator

Step 3. The calculation of the overall performance of the alternatives (S_i).

$$S_i = \ln\left(1 + \left(\frac{1}{m}\sum_j \left|\ln\left(n_{ij}^{x}\right)\right|\right)\right) \quad (2)$$

Step 4. The calculation of the effects of the alternatives.

$$S'_{ij} = \ln\left(1 + \left(\frac{1}{m}\sum_{k,k\neq j} \left|\ln\left(n_{ik}^{x}\right)\right|\right)\right) \quad (3)$$

Step 5. The calculation of the sum of deviations.

$$E_j = \sum_i \left|S'_{ij} - S_i\right| \quad (4)$$

Step 6. The calculation of the weights of the indicators.

$$w_j = \frac{E_j}{\sum_k E_k} \quad (5)$$

After determining the importance of the indicators in terms of the weights, the SEE countries are ranked so as to identify which countries are more prepared to implement AI. The CORASO method was designed to rank the alternatives based on the alternative solutions representing the maximum or minimum values of the alternatives for individual indicators, based on which it can be said that the ranking is performed on the best or the worst values of the alternatives for the indicators. For an alternative to rank better, this method (Puška *et al*, 2024) requires values closer to the maximum values and as far from the minimum values as possible.

Step 1. Forming a decision matrix.

Step 2. Data normalization.

$$n_{ij} = \frac{x_{ij}}{\max x_j}\text{; for the benefit indicators} \quad (6)$$

Step 7. Determining alternative solutions.

Step 8. Weighting normalized data.

$$v_j = w_j \cdot n_{ij} \quad (7)$$

Step 9. Aggregate values.

$$S_j = \sum_{i=1}^{n} \tilde{v}_j \quad (8)$$

Step 10. Deviations from alternative solutions.

$$R_j = \frac{S_j}{S_{j\,max\,AS}} \quad (9)$$

$$R'_j = \frac{S_{min\,AS}}{S_j} \tag{10}$$

Step 11. Determining the value of the CORASO method.

$$Q_i = \frac{R_j - R'_j}{R_j + R'_j} \tag{11}$$

After the ranking order is determined, a sensitivity analysis is performed in order to determine the indicator with the biggest influence on the ranking order (Lukić, 2024) of the SEE countries.

RESULTS

To identify the SEE countries with the biggest potential for applying AI in order to foster sustainable growth, the initial decision matrix (Table 1) is first created, which is the first step in both the MEREC and CORASO methods.

After the initial decision matrix is formed, it is necessary to normalize the data to make it uniform and ready for analysis. Since each indicator should be as large as possible, it is necessary that normalization, in which the highest values are first identified for each indicator, then the individual data within each indicator are divided by the highest value, should be performed for the benefit indicators. For the indicator C1 and Albania, the calculation is as follows:

$$n_{11} = \frac{83.88}{98.75} = 0.849 \tag{12}$$

This procedure is applied to all the data in the decision matrix, forming normalized data and the normalized decision matrix (Table 2). The resulting normalized decision matrix is used to calculate the importance of the indicator weights using the MEREC method and determine the ranking of the SEE countries using the CORASO method.

The next step in the MEREC method is to calculate the overall performance of the alternatives (S_i). In this step, the absolute value of the natural logarithm is first calculated for all the normalized data. The sum of these values is calculated for each alternative, and this value is divided by the number of the indicators, with the value one (1) added to the obtained value. Finally, the value of the natural logarithm of this value is recalculated. The calculation of the individual steps of these methods is explained using the example of Albania and the indicator C1.

$$S_1 = \ln(1 + (\frac{1}{9}(|\ln(0.849)| + |\ln(0.713)| + |\ln(0.563)| + |\ln(0.704)| + |\ln(0.670)| + |\ln(0.374)| + |\ln(1.000)| + |\ln(1.000)| + |\ln(0.675)|)) = 0.3043 \tag{13}$$

In this way, the values of the total performance of the alternatives (S_i) are calculated for the other countries. Then, the effects of the alternatives are calculated in the same way as has been done in the previous step, except that the indicator which this step is calculated for is overlooked. This forms the decision matrix

Table 1 The initial decision matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Albania	83.88	59.68	36.77	36.60	35.48	13.01	72.72	59.69	59.31
Bosnia and Herzegovina	78.90	53.72	32.55	36.24	33.42	18.10	33.38	29.09	44.48
Bulgaria	87.58	83.66	65.31	37.59	49.79	26.24	52.05	49.65	59.07
Montenegro	89.41	66.98	52.06	36.76	37.88	25.55	54.11	44.78	58.73
Greece	90.61	81.34	55.69	51.96	52.93	34.77	55.99	58.83	87.84
Croatia	95.05	67.95	59.84	47.56	46.20	25.41	50.29	49.28	63.88
N. Macedonia	98.75	54.86	45.88	34.95	39.53	22.61	49.10	40.80	56.15
Romania	78.80	60.96	53.98	45.53	47.32	28.39	43.25	50.95	82.81
Serbia	85.90	78.40	37.74	49.21	43.57	21.89	50.76	48.73	80.04

Source: Authors

that includes the effects of the alternatives. Lastly, the absolute value of the sum of the deviations is calculated, as well as the indicator weights (Table 3). The results of the MEREC method show that the indicator C6 - maturity - has the highest weight, only to be followed by the indicator C7 - adaptability, while the indicator C1 - data representativeness - has the lowest weight.

Table 2 The normalized decision matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Albania	0.849	0.713	0.563	0.704	0.670	0.374	1.000	1.000	0.675
Bosnia and Herzegovina	0.799	0.642	0.498	0.697	0.631	0.521	0.459	0.487	0.506
Bulgaria	0.887	1.000	1.000	0.723	0.941	0.755	0.716	0.832	0.672
Montenegro	0.905	0.801	0.797	0.707	0.716	0.735	0.744	0.750	0.669
Greece	0.918	0.972	0.853	1.000	1.000	1.000	0.770	0.986	1.000
Croatia	0.963	0.812	0.916	0.915	0.873	0.731	0.692	0.826	0.727
N. Macedonia	1.000	0.656	0.702	0.673	0.747	0.650	0.675	0.684	0.639
Romania	0.798	0.729	0.827	0.876	0.894	0.817	0.595	0.854	0.943
Serbia	0.870	0.937	0.578	0.947	0.823	0.630	0.698	0.816	0.911

Source: Authors

Table 3 The indicator weights calculation by the MEREC method

		C1	C2	C3	C4	C5	C6	C7	C8	C9	S_i
	Albania	0.163	0.338	0.574	0.350	0.400	0.983	0.000	0.000	0.393	0.304
	Bosnia and Herzegovina	0.224	0.443	0.696	0.360	0.460	0.653	0.779	0.719	0.680	0.443
	Bulgaria	0.120	0.000	0.000	0.324	0.061	0.281	0.334	0.184	0.397	0.173
	Montenegro	0.099	0.222	0.227	0.346	0.335	0.308	0.296	0.287	0.403	0.247
	Greece	0.086	0.028	0.159	0.000	0.000	0.000	0.261	0.015	0.000	0.059
	Croatia	0.038	0.208	0.087	0.088	0.136	0.314	0.369	0.192	0.319	0.178
	N. Macedonia	0.000	0.422	0.353	0.397	0.292	0.430	0.393	0.380	0.447	0.297
	Romania	0.226	0.317	0.191	0.132	0.112	0.203	0.520	0.158	0.059	0.193
	Serbia	0.139	0.065	0.548	0.054	0.195	0.463	0.360	0.203	0.093	0.212
		C1	C2	C3	C4	C5	C6	C7	C8	C9	
S'_{ij}	Albania	0.291	0.276	0.256	0.275	0.271	0.220	0.304	0.304	0.272	
	Bosnia and Herzegovina	0.427	0.411	0.392	0.417	0.410	0.395	0.386	0.390	0.393	
	Bulgaria	0.162	0.173	0.173	0.142	0.167	0.147	0.141	0.156	0.135	
	Montenegro	0.238	0.228	0.227	0.217	0.218	0.220	0.221	0.222	0.212	
	Greece	0.050	0.056	0.042	0.059	0.059	0.059	0.031	0.058	0.059	
	Croatia	0.174	0.158	0.170	0.169	0.165	0.148	0.143	0.160	0.148	
	N. Macedonia	0.297	0.262	0.268	0.264	0.273	0.261	0.264	0.265	0.260	
	Romania	0.172	0.164	0.175	0.181	0.183	0.174	0.144	0.178	0.188	
	Serbia	0.199	0.206	0.161	0.207	0.194	0.169	0.179	0.193	0.203	
E_j		0.096	0.173	0.242	0.175	0.167	0.312	0.292	0.180	0.237	
w_j		0.051	0.092	0.129	0.093	0.089	0.167	0.156	0.096	0.127	

Source: Authors

After calculating the weights of the indicators, the SEE countries are ranked using the CORASO method based on the Government AI Readiness Index. Then, the normalized data are calculated, and alternative solutions are determined. The maximum alternative solution is the maximum value of the normalized data for each indicator. In contrast, the minimum alternative solution is the minimum value of the normalized data for each indicator. Finally, the normalized data are multiplied by appropriate weights.

$$v_{11} = 0.051 \cdot 0.849 = 0.043 \qquad (14)$$

The next step implies the calculation of the aggregate values of the SEE countries and the alternative solutions.

$$S_1 = 0.043 + 0.066 + 0.073 + 0.066 + 0.060 + 0.062 + 0.156 + 0.096 + 0.085 = 0.707 \qquad (15)$$

Then, the deviation from the alternative solutions is calculated. Finally, the value of the CORASO method is calculated as well.

$$R_1 = \frac{0.707}{1.000} = 0.707$$
$$R'_1 = \frac{0.528}{0.707} = 0.747$$
$$Q_1 = \frac{0.707-0.747}{0.707+0.747} = -0.027 \qquad (16)$$

The results of the CORASO method (Table 4) show that Greece, Bulgaria, and Croatia display the best results. Bosnia and Herzegovina shows the worst results. These results indicate that the EU SEE countries outperform non-EU SEE countries. According to the results of the CORASO method, Greece has results (0.2487) much better than the results of all the other countries, whereas Bosnia and Herzegovina has by far the worst results (-0.2634).

Sensitivity analysis aims to determine the extent to which an individual indicator affects the ranking (Trung, Dudić, Dung & Truong, 2024). During the sensitivity analysis conducted in this study, scenarios are formed based on the initial weights of the indicators. Each indicator is reduced by 85%. In comparison, the other indicators are increased by 5% (Table 5), so the sum of the weights of the indicators is

Table 4 The CORASO method results

	S_i	R_i	R'_i	Q_i	Rank
Albania	0.7070	0.7070	0.7470	- 0.0275	7
Bosnia and Herzegovina	0.5549	0.5549	0.9517	- 0.2634	9
Bulgaria	0.8203	0.8203	0.6439	0.1205	2
Montenegro	0.7479	0.7479	0.7062	0.0287	6
Greece	0.9370	0.9370	0.5637	0.2487	1
Croatia	0.8065	0.8065	0.6549	0.1037	3
N. Macedonia	0.6917	0.6917	0.7635	- 0.0493	8
Romania	0.8062	0.8062	0.6551	0.1034	4
Serbia	0.7747	0.7747	0.6818	0.0638	5
MAX AS	1.0000				
MIN AS	0.5282				

Source: Authors

approximately equal to unity (1). Since there are nine indicators, nine scenarios are formed. The ranking is performed using the CORASO method.

The sensitivity analysis results confirm the original results of the CORASO method, indicating that Greece achieves the best results in all the scenarios, while Bosnia and Herzegovina achieves the worst in all the scenarios (Figure 1). The other countries change their ranking depending on the scenario applied. Thus, Bulgaria's ranking order changes in two scenarios (S2 and S3), the reason for which should be looked for in the fact that Bulgaria has the best indicators of all the countries in terms of data availability (C2) and infrastructure (C3). With the decreasing importance of these indicators, Bulgaria falls to third place in the ranking and is overtaken by Croatia, in the scenario S2, and Romania, in the scenario S3. This analysis reveals that no single indicator is decisive for the ranking of the SEE countries. Still, all of them have an equal impact, so the changes in the ranking are negligible.

DISCUSSION

AI plays a major role in the achievement of national growth and particularly in the sustainable development of countries (Goralski & Tan, 2020;

Table 5 The sensitivity analysis scenarios

	C1	C2	C3	C4	C5	C6	C7	C8	C9
S0	0.0510	0.0923	0.1290	0.0934	0.0891	0.1667	0.1559	0.0959	0.1267
S1	0.0077	0.0969	0.1355	0.0981	0.0936	0.1751	0.1637	0.1007	0.1330
S2	0.1046	0.0138	0.1355	0.0981	0.0936	0.1751	0.1637	0.1007	0.1330
S3	0.1046	0.0969	0.0194	0.0981	0.0936	0.1751	0.1637	0.1007	0.1330
S4	0.1046	0.0969	0.1355	0.0140	0.0936	0.1751	0.1637	0.1007	0.1330
S5	0.1046	0.0969	0.1355	0.0981	0.0134	0.1751	0.1637	0.1007	0.1330
S6	0.1046	0.0969	0.1355	0.0981	0.0936	0.0250	0.1637	0.1007	0.1330
S7	0.1046	0.0969	0.1355	0.0981	0.0936	0.1751	0.0234	0.1007	0.1330
S8	0.1046	0.0969	0.1355	0.0981	0.0936	0.1751	0.1637	0.0144	0.1330
S9	0.1046	0.0969	0.1355	0.0981	0.0936	0.1751	0.1637	0.1007	0.0190

Source: Authors

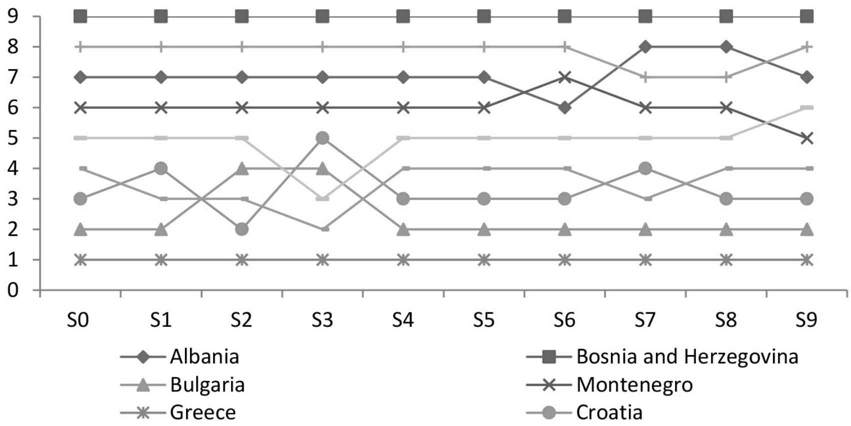

Figure 1 The sensitivity analysis results

Source: Authors

Liengpunsakul, 2021). AI has a wide range of applications and can be used to achieve sustainability goals. However, to achieve sustainable development through AI, a country must have a good potential for AI application. A country's potential for AI application can be investigated in different ways. Applying the Report of the Government AI Readiness Index indicator is one of the methods used in this study. This report has been used in previous studies (Nzobonimpa & Savard, 2023; Nasution *et al*, 2024) but has not been used in ranking the SEE countries.

The readiness to apply AI is an important factor in the assessment of the possibility of integrating AI into various sectors of the economy, public administration, and the functioning of a country's society. Using the Government AI Readiness Index, this research provides an insight into the level of infrastructure, innovation, and the other factors that form the basis for the implementation of AI solutions, as was done in the A. Socol and I. C. Iuga (2024) research study. These factors are presented in the indicators contained in this report. A total of nine indicators were used to observe the SEE countries. The specificity of these countries lies in their varying levels of development, with some countries (such as Albania, Serbia, Bosnia and Herzegovina, North Macedonia, and Montenegro) belonging to developing countries. These countries are also EU accession candidate countries (Ramasauskaite, 2024). However, Bulgaria and Romania are also developing countries, even though they are EU members (Gajović, 2024). These countries should use AI to improve environmental efficiency, better manage economic processes, and ensure better social inclusion (Talapbayeva, Yerniyazova, Kultanova & Akbayev, 2024).

This research study focuses on the SEE countries in order to assess their readiness to implement AI technology, particularly in achieving sustainable growth and development. Two MCDM methods are used for this purpose, namely MEREC and CORASO. The purpose of these methods, along with other MCDM methods, is to rank alternatives based on selected indicators (Đukić, Novićević Čečević & Jevtić Tomić, 2025). The MEREC method was utilized in this study to determine the significance of the indicators used. This method is one of the objective methods for determining indicator weights. It determines the indicator weight based on data dispersion in that particular indicator in relation to other indicators. The more dispersed data, the higher the indicator weight, and vice versa. In this way, the maturity indicator received the highest weight because the normalized data value ranged from 0.374 to 1.000. This indicator is followed by the adaptability indicator, where the normalized data values ranged from 0.459 to 1.000. This should be kept in mind when using this method in future research. The advantage of determining the indicators in this way is reflected in the avoidance of subjectivity in decision-making; the disadvantage, however, implies that some indicators may not be particularly important and receive a greater weight than others. Therefore, it is important to determine when to use the method for subjective or objective weight determinations.

After the weights had been determined, the CORASO method was used. The results of this method showed that Greece had the best indicators compared to the other SEE countries, which was because it had the best values in four indicators: C4 - Human Capital, C5 - Innovation Capacity, C6 - Maturity, and C9 - Governance and Ethics. On the other hand, Albania and Bulgaria had the best results in two indicators. Bulgaria, therefore, ranked second, whereas Albania ranked only seventh among the included countries, the reason for which should be sought in the values of the other indicators with the lowest value even in the indicator C6 - Maturity. This indicator was also the most important in determining the ranking; although Albania had the best values in two indicators, it ranked only seventh.

To improve these countries' potential for applying AI in sustainable development, a sensitivity analysis was conducted. This analysis highlighted both the strengths and weaknesses of each observed country. However, Greece was the best in all nine scenarios, whereas Bosnia and Herzegovina was the worst, indicating that Greece was ahead of the SEE countries, whereas Bosnia and Herzegovina needed to improve several indicators so as to realize its full potential. This analysis revealed that Croatia needed to enhance the data availability indicator, whereas Albania required improvement in the maturity indicator. After determining their potential, these countries must use AI more effectively in sustainable development. They must improve their practice of applying AI and invest more in developing AI solutions. First, of course, it is necessary to improve public administration in order to enhance the services it provides to businesses and the population. This research was therefore conducted so as to determine the potential of the SEE countries in terms of changing AI.

CONCLUSION

The research aimed to examine the potential for applying AI as a factor in achieving sustainable development in the SEE countries. The Government AI Readiness Index was used to assess each SEE country's ability to implement AI. To identify which countries have the best potential for AI implementation, the MEREC and CORASO MCDM methods, which ranked the SEE countries based on the Government AI Readiness Index indicators, were utilized. The results of the CORASO method showed that Greece had demonstrated the strongest indicators, whereas Bosnia and Herzegovina had showed the lowest potential for developing AI solutions. The results obtained from the MEREC method indicated that the maturity and adaptability indicators had received the highest weight values and had the greatest influence on the ranking. In contrast, the data representativeness indicator had the least influence.

Policymakers can use the findings of this research to improve the conditions in individual SEE countries, thus encouraging a broader adoption of AI in practice. The results of the sensitivity analysis can play a key role in this effort. The analysis showed that Greece had achieved the best results across all the scenarios, whereas Bosnia and Herzegovina had shown the worst. These findings indicate that Greece does not have weak indicators regarding AI implementation and should continue to build on its strengths to make further improvements. In contrast, Bosnia and Herzegovina needs a complete overhaul to enhance its AI potential. Without such changes, Bosnia and Herzegovina risks falling behind the other countries in AI application, which may make it less competitive as AI is becoming increasingly integrated into practice.

Additionally, this research study shows that the EU member states have a greater potential than the EU candidate countries, which suggests that the candidate countries should put more effort into building their potential, particularly regarding the application of AI solutions for enhanced sustainable development. Specifically, these countries must improve their digital infrastructure, strengthen institutional support, and increase investment in AI technologies. These actions are essential for the implementation of AI solutions. To do this, it is important to develop the strategies that guide these countries to invest more in the AI solutions that boost environmental efficiency, improve economic processes, and foster social inclusion. By doing so, these countries can improve their competitiveness in the global digital landscape, which is vital for their growth.

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PROCENA POTENCIJALA PRIMENE VEŠTAČKE INTELIGENCIJE ZA ODRŽIVI RAZVOJ U ZEMLJAMA JUGOISTOČNE EVROPE

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Veštačka inteligencija (AI) postala je ključni faktor u razvoju zemalja. Države su prepoznale potencijal primene veštačke inteligencije u ostvarivanju ciljeva održivog razvoja. Ovo istraživanje ispituje potencijal zemalja Jugoistočne Evrope (SEE) u oblasti primene veštačke inteligencije. Za procenu spremnosti za primenu AI koristi se Indeks spremnosti vlade za veštačku inteligenciju (Government AI Readiness Index), koji obuhvata devet indikatora. Poređenje zemalja Jugoistočne Evrope u pogledu primene veštačke inteligencije sprovedeno je primenom metoda višekriterijumskog odlučivanja (MCDM). U istraživanju su korišćene metode MEREC (Method based on the Removal Effects of Criteria) i CORASO (COmpromise Ranking from Alternative SOlutions). Rezultati metode MEREC pokazuju da indikatori zrelosti i prilagodljivosti imaju veće vrednosti težina u odnosu na ostale indikatore. Rezultati metode CORASO ukazuju na to da Grčka i Bugarska imaju najpovoljnije vrednosti indikatora, pri čemu analiza osetljivosti potvrđuje ove nalaze.

Ključne reči: veštačka inteligencija, održivi razvoj, Government AI Readiness Index, MCDM, MEREC, CORASO

JEL Classification: F01, Q01, C02, O33