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Western Balkan Countries in Green Transition: Assessment of Results and Challenges

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ABSTRACT

The main policies to promote economic development are targeting green growth, which means economic growth by ensuring that natural assets continue to provide the resources and environmental services on which the well-being of people depends. The paper analyzes the green growth results of 5 Western Balkan countries: Albania, Montenegro, Serbia, Bosnia and Herzegovina, and North Macedonia. These countries share the same geographical location and past; however, since the collapse of Yugoslavia in 1992, they have experienced different development paths, and some, like Montenegro and Serbia, are quite advanced candidates for membership in the European Union. The paper aims to compare their green growth trends, define the most advanced and lagging countries in terms of the main indicators of green growth, and develop policy recommendations to foster green growth in this region. MCDM tool was applied for ranking of 5 Western Balkan countries in terms of green growth.

INTRODUCTION

Currently, the main trend in developed and developing economies is the adoption of green growth development into national development plans; scholars have recently concentrated in their studies on the assessment of green growth performances across countries. Nevertheless, the varied concepts, indicators, and measurements of green growth paths were applied.

There is a lack of clear and consistent definitions and common measures for green growth measurements though there are many attempts to compare findings across multiple studies (Sarkodie et al., 2023; Ates et al., 2021). Therefore, the lack of a common understanding of the meaning of green growth and the use of various varying sets of indicators implies the lack of ability to develop useful guidance for decision-makers (Dunkovic et al., 2022).

Though a number of publications on green growth and various indicators were developed to measure green growth in specific regions and countries (Global Green Growth Institute, 2019; Kim, et al., 2014; Kararach et al., 2018; Li et al., 2019; Sneiderienė et al., 2020; Baniya et al., 2021), however, there are still many gaps in this research area as most indicators are country-specific and mainly aim to address sustainable development goals of the specific countries. However, green growth indicators are not sustainable development indicators, and they are directly linked to concrete green growth strategies developed for specific countries or regions. Therefore, there is a need to develop and test the green growth indicators framework for selected regions or groups of countries based on the specific goals of the Green Growth Strategy developed for this region. The comparative assessment of the group of countries in the selected region allows it to close another gap linked to a limited number of case studies testing green growth indicators for specific regions.

The paper aims to overcome these gaps and develop an indicators system for monitoring green growth achievements based on the main goals of the recent Green Growth Strategy developed for Western Balkans. The developed framework of climate-responsible tourism development was tested and applied for a case study in the Western Balkans. The Western Balkan region consists of five states (Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and the Republic of Serbia). Multi-criteria decision-aiding methods (MCDM) were applied to rank Western Balkan countries based on their achievements in green growth. Policy recommendations were developed based on the study conducted.

The rest of the paper is structured in the following way: in section 1, a literature review and background of the study are provided; section 2 introduces methods and data; section 3 discusses case study results; and section 4 concludes and provides policy recommendations to foster green growth in Western Balkans.

1. LITERATURE REVIEW AND BACKGROUND

The OECD in 2009 defined the term of green growth as achieving sustained economic development while reducing the negative environmental externalities, including climate change, loss of biodiversity, and natural resource exploitation (OECD, 2009). The organization also became the first to provide a cross-country ranking and comparative framework of green growth indicators for its industrialized countries. The majority of authors dealing with green growth and indicators measuring green growth stress that their framework aligns with that of the OECD concept and propose the growth-accounting approach to reach a broader context of global decision-making (Nassar & Tvaronavicienė, 2021; Rybalkin et al., 2021). A. The environmental productivity dimension of green growth entails the efficient ways by which economic growth is decoupled from resource use (Olzhebayeva et al., 2023). An existing study focused on both ecosystem services and the productive use of resources such as energy, water, and land (Global Green Growth Institute, 2019; Sun et al., 2020). The authors reinforced this dimension with eight indicators ranging from measures such as the share of primary energy provision to GDP to total material footprint per capita (Kim, et al., 2014). For example, four of the six indicators constituting the (Baniya et al., 2021) framework have productivity connotations. These include the productivity of carbon, energy, materials, and the share of renewables. The authors, however, do not take into account policy responses, quality of life, and social inclusion.

The Green Growth Performance Measurement (GGPM) Program, for instance, developed in 2019 utilizes data from 115 countries and relies on 36 sampled indicators categorized under four dimensions (Global Green Growth Institute, 2019). The main dimensions include sustainable and efficient resource utilization, economic opportunities, natural capital protection, and social inclusion. Within the dimension of natural capital protection, indicators such as the proportion of forests, biodiversity cover, and marine protected areas were incorporated. Also, such indicators as mean annual air pollution, GHG emission reductions etc. Were incorporated. New and sustainable economic opportunities, innovations and technological developments are crucial to the success of green growth strategies (Saman, 2022; Roshchyk et al., 2022; Marino & Pariso, 2021; Hajdukiewicz & Pera, 2023). Thus, some authors incorporated socio-economic variables of green growth into their framework (Global Green Growth Institute, 2019; Bhattarai et al., 2023) and employed a dimen-sion termed green economic opportunities—that captures the share of

economic opportunities that arise as investments shift from traditional activities to green sectors (Fernandes et al., 2021; Lee et al., 2018). Kararach et al., 2018) proposed an entire dimension for gender in a framework of seven different indicators. The authors linked green growth with reducing societal inequalities. Li et al. (2019) analyzed fair opportunities in green growth measurements. The quality-of-life dimension of green was also popular in many studies however, different issues of quality of life were applied in different studies. The study by Banya et al., (2019) stressed that the social performance of green growth should be measured because sustained economic growth requires reduced inequalities among people. Kim et al. (2014) proposed to measure quality-of-life by public transportation modal split, stating the importance of this indicator based on its policy relevance, analytical soundness, and measurability.

Just a few studies have included a policy response dimension, like the study by Global Green Growth Institute (2019). Kim et al. (2014) measured the policy response by applying four indicators: environmental expenditure, environmental patents, green ODA per GDP, and green R&D per government budget. Though there are many indicator frameworks created to measure green growth by specific areas like natural assets, environmental productivity, social-economic development, quality of life, and policy response, there is no agreement among authors on what kind of indicators are the most important top measure success of green growth. Therefore, for the measurement of green growth achievement in specific regions and comparative assessment of countries pursuing green growth, a new framework needs to be created by taking into account priorities and goals set by green growth policy documents.

A New Growth Strategy was developed for the countries in the Western Balkans to transition from a traditional economic model to a sustainable economy, in line with the European Green Deal (Prendi & Murrja, 2023, Ignjatovic et al., 2024). In line with the EU's ambition to become climate-neutral by 2050, the Green Agenda for the Western Balkan (GAWB) at the Summit in Sofia was set in 2020. The GAWB Action Plan was endorsed at the Brdo Summit in October in 2021. Therefore, the main policy documents of green growth in the Western Balkans are the Declaration on the (GAWB) Green Agenda for the Western Balkans and the GAWB Action Plan (European Commission, 2024). The main goal is to achieve carbon neutrality by 2050 and align with the European Green Deal's key elements: Cleaning energy sources & protecting the climate; Moving to a circular economy; Depolluting air, water, and soil; Building sustainable agriculture & food systems; Protecting biodiversity and ecosystems (European Commission, 2024).

The main targets for cleaning energy sources & protecting the climate are to reduce greenhouse gas emissions and enhance resilience to the impact of climate change, shifting towards cleaner and renewable energy sources, etc. Transitioning to a fully circular economy is key to achieving a green transition and includes developing strategies to improve the sustainability of raw material production, preventing, reducing, recycling, and managing waste by looking at the entire lifecycle of products and developing regional agreements on the prevention of plastic pollution etc. Depoluting air, water, and soil include these targets: aligning with EU standards related to air quality, water and waste management, investing in wastewater management and promoting water reuse in agriculture, building sustainable agriculture and food systems, including developing sustainable rural areas, increasing food security and quality (Ginevicius, 2022); Reducing waste, promoting environmentally friendly and organic farming, etc. Protecting biodiversity and ecosystems covers these tasks: protecting the wealth of habitats and species and developing and implementing a Western Balkans 2030 Biodiversity Action Plan and a Forest Landscape Restoration Plan, etc. (European Commission, 2024). All these goals of the Green Agenda for the Western Balkan (GAWB) and green growth strategy for Western Balkan countries require indicators of monitoring and assessing the progress of countries in the region: Albania, Montenegro, Serbia, Bosnia and Herzegovina, and North Macedonia.

2. METHODS AND DATA

2.1 COPRAS method

The preference ranking method of complex proportional assessment (COPRAS) method was developed by Zavadskas et al. (2008). In this method, the influence of maximizing and minimizing criteria on the evaluation result is considered separately. The selection of the best alternative is based considering both

the ideal and the anti-ideal solutions. The main procedure of COPRAS method includes several steps (Chatterjee et al., 2011) . Step 1: Set the initial decision matrix, X.

$$X = [x_{ij}]_{m*n} = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ x_{m1} & x_{m2} & \ldots & x_{mn} \end{bmatrix} \quad (1)$$

where x_{ij} is the assessment value of i-th alternative in respect to j-th criterion, *m* is the number of alternatives and *n* is the number of criteria.

Step 2: Normalization of the decision matrix by using the following equation:

$$R = [r_{ij}]_{m*n} = {}^{x_{ij}}\Big/_{\sum_{i=1}^{m} x_{ij}} \quad (2)$$

Step 3: Determination of the weighted normalized decision matrix, D, by using the following equation:

$$D = [y_{ij}]_{m*n} = r_{ij}.W_j, i = 1, \ldots, m, j = 1, \ldots, n \quad (3)$$

where r_{ij} is the normalized performance value of i-th alternative on j-th criterion and w_j is the weight of j-th criterion. The sum of weighted normalized values of each criterion is always equal to the weight for that criterion:

$$\sum_{i=1}^{m} x_{ij} = w_{ij} \quad (4)$$

Step 4: In this step the sums of weighted normalized values are calculated for both the beneficial and non-beneficial criteria by using the following equations:

$$S_{+i} = \sum_{j=1}^{n} y_{+ij}, S_{-i} = \sum_{j=1}^{n} y_{-ij} \quad (5)$$

where y_{+ij} and y_{-ij} are the weighted normalized values for the beneficial and non-beneficial criteria, respectively.

Step 5: Determination the relative significances of the alternatives, Q_i, by using the following equation:

$$Q_i = S_{+i} + \frac{S_{-min} \cdot \sum_{i=1}^{n} S_{-i}}{S_{-i} \cdot \sum_{i=1}^{m} \left({}^{S_{-min}}\Big/_{S_{-i}}\right)}, i = 1, \ldots, m \quad (6)$$

where S_{-min} is the minimum value of S_{-i}.

Step 6: Calculation of the quantitative utility, U_i, for i-th alternative by using the following equation:

$$U_i = \frac{Q_i}{Q_{max}}.100\% \quad (7)$$

where Q_{max} is the maximum relative significance value.

As a consequence of Eq. 6, utility values of the candidate alternatives range from 0% to 100%. The greater the value of U_i, the higher is the priority of the alternative. Based on alternative's utility values a complete ranking of the competitive alternatives can be obtained.

2.2 Green growth indicators framework for Western Balkans

Based on literature review and analysis of various green growth indicators frameworks the system of indicators to measure and monitor green growth in Western Balkans developed by taking into account 5 main goals of A New Growth Strategy: Cleaning energy sources & protecting the climate; Moving to a circular economy; Depolluting air, water, and soil; Building sustainable agriculture & food systems; Protecting biodiversity and ecosystems.

The indicators framework for green growth of Western Balkan countries are provided in Table 1.

Table 1. Indicators of green growth

Indicators	*Measures*	*Description*	*Source*
Clean energy sources and protecting climate			
GHG emissions per capita	tCO2/capita	The indicator measures total national emissions, including international aviation of all greenhouse gases, including carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and the so-called F-gases. Using each gas' individual global warming potential (GWP), they are integrated into a single indicator expressed in units of CO2 equivalents and divided by population	World Bank, 2023
GHG intensity of GDP	Kg CO2/PPP 2017 of USD	The indicator measures total national emissions including international aviation of all greenhouse gases, including carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and the so-called F-gases. Using each gas' individual global warming potential (GWP), they are being integrated into a single indicator expressed in units of CO2 equivalents and divided GDP of the country expressed in PPP 2017 of USD	World Bank, 2023
Share of RES in final energy	%	The indicator measures the share of renewable energy consumption in gross final energy consumption according to the Renewable Energy Directive. The gross final energy consumption is the energy used by end-consumers (final energy consumption) plus grid losses and self-consumption of power plants	European Commission, 2023
Energy productivity	EUR/kgoe	This indicator measures the amount of economic output that is produced per unit of gross available energy. The economic output is either given in EUR 2010 or in PPS (Purchasing Power Standard).	European Commission, 2023
Depolluting air, water, and soil;			
PM2.5 air pollution, mean annual exposure	micrograms per cubic meter	Fine particulate matter (PM2.5) is the air pollutant that poses the greatest risk to health globally, affecting more people than any other pollutant. Chronic exposure to PM2.5 considerably increases the risk of respiratory and cardiovascular diseases in particular. Data refer to population exposure to more than 10 micrograms/m3 and are expressed as annual averages.	World Bank, 2023
Moving to a circular economy			
Rate of recycling of municipal waste,	%	The indicator measures the tonnage recycled from municipal waste divided by the total municipal waste arising. Recycling includes material recycling, composting and anaerobic digestion; and preparing for reuse.	European Commission, 2023
Generation of waste excluding major mineral wastes	kg/capita	The indicator measures all waste generated in a country divided by the population of the country. Major mineral wastes, dredging spoils and soils are excluded.	European Commission, 2023
Building sustainable agriculture & food systems			
The share of area under organic farming in total land area	%	The indicator measures the share of total utilised agricultural area occupied by organic farming (existing organically-farmed areas and areas in process of conversion. Farming is recognised to be organic if it complies with Council Regulation (EC) No 834/2007.	European Commission, 2023
Protecting biodiversity and ecosystems			
Share of protected terrestrial and marine areas in total area	%	This indicator shows the areas of land, water surfaces and adjacent air layer protected in compliance with national legislation. It includes the area of highly protected territories and their share in the total area of the country	World Bank, 2023

Source: (EUROSTAT, 2024; World Bank, 2023)

Therefore, the data on the indicator for Western Balkan countries can be obtained from Eurostat and World Bank databases. The case study was developed and MCDM tools were applied for ranking Western Balkan countries based on green growth indictors.

3. CASE STUDY RESULTS

The following section of the paper analyses discusses and analyses the results of a case study on a comparative assessment of 5 Western Balkan countries (Bosnia & Hercegovina, Montenegro, North Macedonia, Albania and Serbia) based on green growth indicators developed based on strategic goals of A New Growth Strategy for Western Balkans. The main data for analysis and ranking of Western Balkan countries achievement in green growth in 2021 are given in Table 2.

Table 2. Green growth indicators of Western Balkan countries in 2021

Criteria	*Alternatives*		*A1*	*A2*	*A3*	*A4*	*A5*
	Countries	*Desirable trend*	*Bosnia & Hercegovina*	*Montenegro*	*North Macedonia*	*Albania*	*Serbia*
C1	GHG emissions per capita tCO2 eq/capita	decrease	6.31	4.07	3.28	1.55	6.79
C2	GHG intensity of GDP, kg CO2/PPP 2017 of USD	decrease	0.433	0.223	0.208	0.116	0.368
C3	Share of RES in final energy, %	increase	36.6	39.9	17.5	41.4	25.3
C4	Energy productivity	increase	2.26	3.53	3.30	4.99	2.49
C5	PM2.5 air pollution. mean annual exposure, micrograms per cubic meter	decrease	29.47	21.26	30.27	18.64	25.35
C6	Rate of recycling of municipal waste, %	increase	0	4.7	0	18.7	16.8
C7	Generation of waste excluding major mineral wastes, kg/capita	decrease	351	486	441	369	427
C8	The share of area under organic farming in total land area, %	increase	0	1.72	0.61	0.09	0.62
C9	Share of protected terrestrial and marine areas in total area, %	increase	3.98	8.98	12.48	14.18	7.65

Source: (European Commission, 2023; World Bank, 2023)

In Table 3 the results of Initial Matrix are provided.

Table 3. Initial Matrix

weights of criteria	0.111111	0.1111111	0.111111	0.111111	0.1111111	0.111111111	0.111111	0.111111	0.111111
kind of criteria	-1	-1	1	1	-1	1	-1	1	1
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**
A1	6.31	0.433	36.6	2.26	29.47	0	351	0	3.98
A2	4.07	0.223	39.9	3.53	21.26	4.7	486	1.72	8.98
A3	3.28	0.208	17.5	3.3	30.27	0	441	0.61	12.48
A4	1.55	0.116	41.4	4.99	18.64	18.7	369	0.09	14.18
A5	6.79	0.368	25.3	2.49	25.35	16.8	427	0.62	7.65

In Table 4 Weighted Normalized Matrix was developed.

Table 4. Weighted Normalized Matrix

kind of criteria	-1	-1	1	1	-1	1	-1	1	1
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**
A1: Bosnia & Hercegovina	0.0319	0.0357	0.0253	0.0152	0.0262	0.0000	0.0188	0.0000	0.0094
A2: Montenegro	0.0206	0.0184	0.0276	0.0237	0.0189	0.0130	0.0260	0.0629	0.0211
A3: North Macedonia	0.0166	0.0171	0.0121	0.0221	0.0269	0.0000	0.0236	0.0223	0.0293
A4: Albania	0.0078	0.0096	0.0286	0.0335	0.0166	0.0517	0.0198	0.0033	0.0333
A5: Serbia	0.0343	0.0303	0.0175	0.0167	0.0225	0.0464	0.0229	0.0227	0.0180

Quantitative utility and the relative significance of the alternatives are provided in Table 5.

Table 5. Quantitative utility and the relative significance of the alternatives

Alternatives	**S+**	**S-**	**1/S-**	**Q**	**U**
A1: Bosnia & Hercegovina	0.0498	0.1126	8.8840	**0.1152**	40.09
A2: Montenegro	0.1482	0.0839	11.9228	**0.2360**	82.11
A3: North Macedonia	0.0859	0.0842	11.8701	**0.1732**	60.28
A4: Albania	0.1504	0.0537	18.6121	**0.2874**	100.00
A5: Serbia	0.1213	0.1100	9.0879	**0.1882**	65.47

The final ranking of alternatives according to 6 criteria are provided I table 6.

Table 6. Final Ranking

Alternatives	*Rank*
A4: Albania	1
A2: Montenegro	2
A5: Serbia	3
A3: North Macedonia	4
A1: Bosnia& Hercegovina	5

As one can see from the results provided in Table 6, the best-performing country in terms of green growth in 2021 was Albania, following Montenegro and Serbia. The worst performing country according green growth in Western Balkan region was Bosnia & Hercegovina and North Macedonia.

CONCLUSIONS

Western Balkan countries face the similar environmental, economic and social challenges in green growth. The investigation of the five green growth targets set for Western Balkan regions indicates that, despite a few differences, the accomplishment of the set green growth goals needs to be strengthened in all countries. The response should be a prompt reaction and implementing policy actions on targeted indicators.

The main goals of green growth for Western Balkan region are: to associate the region with European Union Gren Deal targets to achieve carbon-neutrality by 2050; continent; open circular economy development perspectives and options; reduce air, water and soil pollution; support organic agriculture and sustainable food production and supply, to enhance biodiversity protection and restoration of ecosystems for unlocking sustainable tourism development potential in Western Balkan region. The targeted indicators were selected to address these five main goals of green growth for the region.

Continuous monitoring of green growth commitments and actions is necessary to improve understanding and evidence about the status quo, progress made, and the catalytic potential actions have to transform the sector towards a climate-responsible one. For this purpose, it is necessary to develop indicators of green growth for Western Balkan countries, to monitor progress achieved and compare countries based on their achievements, to share experiences, and to learn from the best-performing countries.

The MCDM tools applied for ranking of 5 Western Balkan countries based on green growth indicators. The results of the performed comparative case study showed that despite the progress already made, there is still room for improvement

Based on the results of the ranking of Western Balkan countries according to green growth in 2021 by MCDM tool COPRAS, it was found that Albania was the best-performing country in green growth among the examined countries. The Montenegro was found to be the second best-performing country. The Bosnia and Hercegovina received the lowest ranking. The second-worst-performing state on green growth was North Macedonia.

The main reasons for such good performance in green growth for Albania were the best results achieved in GHG emissions per capita, GHG intensity of GDP, energy productivity, share of renewables in final energy consumption, rate of recycling, and share of protected terrestrial areas. In. addition, the air pollution caused by solid particulates was also the lowest in Albania compared to other Western Balkan countries. At the same time, the results in GHG per GDP, energy productivity, rate of recycling, and share of protected terrestrial areas were the worst in Bosnia and Hercegovina in 2021. Montenegro showed good results in an increase in the share of renewables in final energy consumption and share of organic farming, etc.

The study has several limitations. Future research is necessary for a detailed analysis of green growth-fostering policies implemented in Western Balkan countries to define the effectiveness of these policies in terms of achieving green growth goals.

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