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Assessment of Green Growth in the Baltic States

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ABSTRACT EU Green Deal and US Green New Deal strategies indicate that green growth is at the center of the policy agendas of many developed countries and regions. The green growth is a key element in achieving sustainable development. Green growth is an economic growth strategy that prioritizes human development while guaranteeing that natural resources continue to provide environmental services to the current and future generations to achieve their sustainable development. There are many definitions of green growth, and many indicators and measures have been developed to assess green growth results for countries. The paper aims to analyze green growth indicators and measures and develop a case for a comparative assessment of green growth achievements in the Baltic States. The Baltic States were ranked based on their achievements according to specific dimensions of green growth, and policy recommendations to promote green growth were developed based on conducted research.

KEY WORDS: green growth, indicators, assessment, ranking, Baltic States.

JEL Classification: P18, Q01, Q32, Q58.

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1. Introduction

Green growth is a term used to describe a way of achieving economic growth while preserving the environment through the sustainable use of natural resources. This concept has gained more importance in recent years as politicians advocate for policies that prioritize the protection of the environment alongside economic development and growth (Bagheri et al., 2018). In recent times, the importance of promoting sustainable and environmentally friendly economic growth has significantly increased. Therefore, it is crucial for policymakers to develop policies and measures to balance economic growth and environmental protection.

The UN Global Green New Deal (Barbier, 2009) calls on governments to allocate a significant share of stimulus funding to green sectors. Its main objectives include economic recovery, eradication of poverty, and reduced carbon emissions and ecosystem degradation. The main aim is to foster sustainable development goals.

The European Green Deal sets the blueprint for the green growth of the EU. Green growth should benefit EU member states, from creating new opportunities for innovation, investment, and green jobs to improving our health and well-being. US Green New Deal calls for state policies to deal with climate change and accomplish other social and economic goals such as new high-quality job creation, increasing equality between people, reducing poverty and exclusion, and ensuring stable economic growth in the US.

Countries that agree to work together on green growth need to establish shared goals, monitor progress, and take measures to achieve them.

There is plentiful literature on green growth (Capasso et al., 2019; Ferreira et al., 2023; Herman et al., 2023; Pan et al., 2020; Saleem et al., 2022; Tawiah et al., 2019; Zhao et al., 2022). Most of the stud-

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ies analyzed measures for green growth and tried to provide the background for the best indicators and frameworks to monitor and compare the advancement of countries toward green growth and sustainable development (Birgani & Moghaddam, 2018; Diaz-Sarachaga et al., 2018; Guo et al., 2020; Kararach et al., 2018; Koch & Krellenberg, 208; Kwatra et al., 2020).

It is important to state that green growth indices used in various studies are not yet standardized (Zhao et al., 2022). Therefore, scientific knowledge and understanding of green growth and its outcomes need to be further developed (Šneiderienė et al., 2020).

The more universal green growth indicators framework is necessary for the analysis of green growth and sustainable development progress achieved by countries

The main objective of this paper is the examination of green growth and sustainable development indicators, and frameworks and the application of selected green growth indicators framework for comparative analysis and assessment of green growth results in the Baltic States.

The rest of the paper is structured in the following way: in Section 2, the literature review on the topic is provided, in Section 3, the analysis of green growth indicators is performed, and the green growth indicators framework is selected for the case study; in Section 4 the results of empirical application of green growth indicators framework for Baltic States case study is discussed; in Section 5 conclusions and policy recommendations are provided.

2. Literature Review

Many characterizations of green growth can be discovered in scientific literature. One of them, which is very popular and introduced by the Organisation for Economic Co-operation and Development (OECD): green growth aims to promote economic progression while also preserving natural resources that provide essential environmental services supporting the well-being of the world population. (Organisation for Economic Co-operation and Development [OECD], 2011). Therefore, green growth can be treated as a main element for accomplishing sustainable development, i.e. pursuing economic growth by protecting the environment (Capasso et al., 2019). Another definition of green growth is a decoupling concept, namely, reducing the environmental impact associated with the growth of GDP (Juknys et al., 2014). Absolute decoupling is a desirable trend for green, meaning that the GDP and natural resource consumption variables become independent of one another and are, therefore, free to go in opposite directions. An increase in GDP could arise at the same time with a significant fall in resource consumption or environmental impact (Balardi, 2014; Lorente & Álvarez-Herranz, 2016).

Studies dealing with green growth analyze barriers and drivers of green growth. Green technological innovations are considered to be very important drivers of green economic growth and sustainable development of the country (Kijek & Kasztelan, 2013; Samad & Manzoor, 2015). Also, studies highlighted the importance of skills, knowledge, and human capital development as preconditions of green growth (Calzonetti et al., 2012; Gibbs & O'Neill, 2014; Lopes, 2015; Saman, 2022).

Also, there are many studies (Campasso et al., 2019; Elliott & Clement, 2015; de Medeiros et al., 2014) analyzing the role of markets in promoting or hampering green growth. These studies can be divided into three main areas: assessment and investigation of the quality of various market elements, the interaction between policy and markets, and the availability of market elements providing for economic greening.

The importance of available resources in the country among other drivers of green growth was highlighted in several papers (Bretschger & Smulders, 2012; De Cian et al., 2016; Delibasic, 2022).

The quality of institutions was mentioned as an important driver of green growth in a few studies (Delibasic, 2022; Elliot, 2011; Lorek & Spangenberg, 2014; Sen, 2015).

The role of policy as the main driver of green growth was addressed in a number of studies Drake, 2013; Karkatsoulis et al., 2016; Li et al., 2016; Musolesi & Mazzanti, 2014).

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Findings from the study (Tawiah et al., 2021) showed that economic development policies leading to GDP growth are among the most important elements for achieving green growth and sustainability goals of the countries.

The research conducted by Saleem et al. (2020) investigated how green growth influenced various aspects such as the rise in population income, the rapid adoption of environmental technologies and renewable energy, and the outcomes of financial development in 12 key Asian economies spanning from 1990 to 2018. The study showed the encouraging impact of green growth on environmental quality and other important economic and social indicators.

The main challenges of green growth, according to several studies (Campasso et al., 2019; Grillitsch et al., 2019; Laranja et al., 2008; Weber & Rohracher, 2012), are linked to the three types of failures: markets' failures as well as structural and transformational systems' failures.

An important scope of the contemporary literature on policies fostering green economic growth and sustainable development (Binz et al., 2017; Campasso et al., 2019; Flanagan et al., 2011; Rogge & Reichardt, 2016;) highlighted the need for a combined comprehensive analysis of various policies and measures in the green growth area to define their efficiency, effectiveness, and efficacy.

This requires a deeper investigation of the interaction between various policies and measures and an analytical perspective, including developing indicators frameworks for monitoring progress towards green growth and sustainable development and assessing the impact of policies on green growth and sustainable development progress.

3. Indicators for Assessment of Green Growth

The range of global indexes was developed to make a comparison of sustainable development directions of specific countries. The indicators of sustainable development are considered analytical tools and are discussed in many studies. Virto (2018) provided the initial appraisal of various Sustainable Development indicators by highlighting the rationale of the SDGs, conceptual background, and analysis of fundamental aspects like uncertainty, irreversibility, and so on. A study by Koch and Krellenberg (2018) analyzed the available SDG regional indexes that targeted ultimate goals. Diaz-Sarachaga et al. (2018) investigated the implementation of Agenda 2030 of various countries based on the composite sustainable development index (SDGI).

Kwatra et al. (2020) analyzed all available SDG indexes and found above 95% similarity between SDGs created by applying artificial neural networks. The creation of all Sustainable Development Goals Indexes (SDGIs) was established in line with top-down methodologies (Kwatra et al., 2020).

Olivera et al. (2020) proposed an integrated Well-being Global Index (WeGIx) comprising forty-three indicators for measuring the overall progress toward attaining the SDGs. It aimed to evaluate the quality of life from a global perspective and to show the comparative situation of countries in progress toward sustainable development.

There are several indicators and frameworks developed to monitor green growth by linking it with sustainable development goals. Birgani and Moghaddam (2018) evaluated the Environmental Sustainability Index (ESI), which encompasses 76 variables combined into 21 indicators of ecological sustainability like endowments of resources, the environmental protection quality of the state, the capacity of the state to improve environmental efficiency, past and present pollution levels at the country, and so on.

The Environmental Performance Index (EPI) comprises sixteen indicators that assess the progress of a country toward sustainability by applying such indicators as child mortality, air pollution, access to energy and drinking water, the share of renewables in energy consumption, the energy intensity of GDP; carbon intensity of energy consumption, the carbon intensity of GDP, and so on. (Pimonenko et al., 2018).

The World Bank has constructed the Green Index to measure measures the wealth of countries by using a new system and assessing the price of produced assets, like the sum of all manufacturing machinery, energy generation plants, factories, roads, and other infrastructure available in the country (Guo et al., 2020).

The Global Green Economy Index (GGEI) assesses the performance of the country in terms of sustainability. The GGEI provides data for the assessment of 160

countries and applies eighteen indicators to measure the progress of the country in terms of the dynamics of these indicators since 2005. Also, the distance of each indicator from globally established targets is addressed if such a benchmark exists for specific indicators.

State of Green Transition Index was developed as a graphical communication instrument to inspire decision-makers on all levels, as well as international media, showing the national performance of countries in pursuing green growth and providing the rank of countries based on expert assessments (Kararach et al., 2018).

The level of sustainable development or green growth achievements should be evaluated in line with the developed green growth strategy by applying certain criteria and indicators. As for most indicator systems, the main weaknesses are linked with data gaps; the Green Growth Index was selected for the comparative assessment of Baltic States. The Green Growth Index was developed by the Global Green Growth Institute to evaluate the performance of countries in achieving their main goals of sustainable development and green growth including the Sustainable Development Goals (SDGs), Paris Agreement, and Aichi Biodiversity Targets. GGGI was created in 2012 at the Rio+20 United Nations Conference on Sustainable Development as an international intergovernmental body aiming to help countries achieve their sustainable development goals. It supports UN Members in transforming their economic growth into a green growth pattern. It provides comprehensive data from 2015 to 2022 to 197 countries (Acosta et al., 2019).

The Green Growth Index consists of four related dimensions: social inclusion, efficient and sustainable resource use, natural capital protection, and green economic opportunities. Their interrelations are based on transformations to low carbon energy and economy concept, provision of ecosystem health, ensuring inclusive economic growth, and building the resiliency of economy and society. The Green Growth Index is created by a step-by-step method for constructing the composite indices. An integrated index integrates several indicators into a single score, allowing the assessment of progress achieved and monitoring, comparison, and ranking of countries according to different dimensions and creating of benchmarks for such complex phenomena like green growth (Acosta et al., 2020).

In Table 1 the indicators comprising the green development index and their aggregation by categories and dimensions are given.

Table 1
Indicators of Green Growth

Standardized indicators	Level 1: categories	Level 2: dimensions	Level 3: index
	Linear aggregation of standardized indicators	Geometric aggregation of indicators categories	Geometric aggregation of dimensions
EE: Primary energy supply to GDP EE2: Portion of renewables to final energy	Efficient and sustainable use of energy	Efficient and sustainable resource usage	Green Growth index
EW1: Water use efficiency EW2: Portion of freshwater withdrawal to existing freshwater resources	Efficient and sustainable use of water		
SL1: Nutrient budget of the soil SL2: Portion of organic agriculture used the land to total area of agricultural land	Sustainable use of land		
ME1: Total material consumption per GDP ME2: Total material footprint per inhabitant	Material use efficiency		

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Table 1
Indicators of Green Growth (Continued)

Standardized indicators	Level 1: categories	Level 2: dimensions	Level 3: index
	Linear aggregation of standardized indicators	Geometric aggregation of indicators categories	Geometric aggregation of dimensions
EQ1: Mean annual population-weighted exposure to air pollution by PM2.5 EQ2: DALY (disability-adjusted life year) rate due to unsafe water sources EQ3: Municipal solid waste generation per inhabitant	Quality of environment	Natural capital protection	Green Growth index
GE1: GHG emissions to the population with GHG emissions Agriculture, Forestry, and Other Land Use GE2: GHG emissions to the population without GHG from Agriculture, Forestry, and Other Land Use GE3: Non-CO2 emissions from agriculture to population	Greenhouse gas emission reduction		
BE1: Average share of Key Biodiversity Areas covered by protected areas BE2: Proportion of forest land area to total area BE3: Above-ground biomass stock in forest	Biodiversity and ecosystem protection		
CV: Red list index CV2: Tourism and recreation activities of coastal and marine areas CV3: Proportion of terrestrial and marine protected areas to total area	Cultural and social value		
GV1: Adjusted net savings, including particulate emission damage	Green investment	Green economic opportunities	
GT: Proportion environmental goods export in total export	Green trade		
GJ1: Proportion of green employment in total employment of the manufacturing sector	Green employment		
GN1: Proportion of patents in environmental technology in total patents	Green innovation		
AB: Safely managed water and sanitation access AB2: Electricity and clean technology access AB3: Fixed internet broadband and mobile cellular subscriptions	Access to basic services and resources	Social inclusion	
GB1: Seats held by women in parliament GB2: Number of accounts held at financial institutions GB3: Laws and regulations covering the right for equal gender pay	Gender balance		
SE1: Inequality in income based on Palma ratio SE2: Ratio of urban-rural access to basic services SE3: Proportion of youth not in education, employment, or training	Social equity		
SP1: Proportion of population above statutory pensionable age receiving a pension SP2: Universal health coverage service index SP3: Share of urban population living in slums	Social protection		

Source: created by authors based on (Acosta et al., 2019; Global Green Growth Institute, 2023).

The Green Growth Index has scores from 1 to 100, with a score of 1 indicating very low performance and a score of 100 indicating the highest performance. The indicators are compared to sustainability targets, and a score of 100 indicates that a country has achieved a specific target. The scores are allocated into specific intervals and can be interpreted as follows: a score of 80-100 means that a country has achieved or almost achieved the target. A score of 60-80 indicates that the country is taking a strategic position to fully reach its target. A score of 40-60 is classified as a moderate score, as the country is going forward and avoiding moving away from the target. A score of 20-40 indicates the need for the country to define the right policies to move towards achieving its target. Finally, a score of 1-20 is a very low score. This low score indicates that significant efforts are necessary to improve the country's situation to move towards the target (Global Green Growth Institute, 2023).

4. Ranking of Baltic States Based on Green Growth Results

Results achieved by the Baltic States in green growth were analyzed and compared during the 2010-2022 period. The scores for four dimensions of green growth were decomposed according to main categories to define the best performing and lagging countries according to various dimensions and categories within dimensions. The dynamics of green growth indexes for the Baltic States are compared in Figure 1.

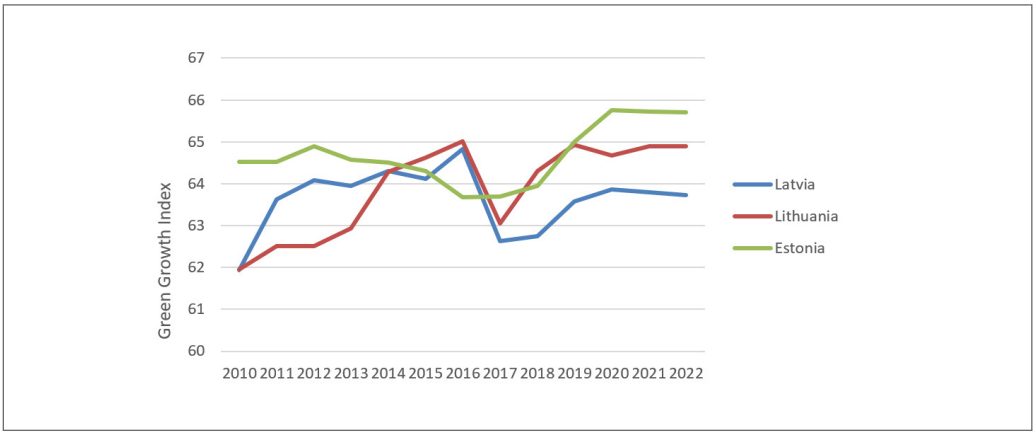
As one can notice from Figure 1, since 2018, Estonia has been the leading country in green growth achievements among the Baltic States, with some fluctuation in 2019. Latvia lost its position in 2017, and since then, it has been the worst-performing country in terms of green growth among the Baltic States. All countries have scores above 60 or very high, meaning that they are taking a strategic position to completely reach the target.

In Figure 2, the scores according to the social inclusion dimension were compared in Baltic states during the 2010-2022 period.

One can notice from the data plotted in Figure 2 that during the entire investigated period, Estonia was the best-performing country according to the social inclusion dimension of green growth. At the same time, Latvia and Lithuania showed very similar progress according to social inclusion in green growth from 2010 to 2022, though the path was quite different. Lithuania showed almost continuous growth in social inclusion during the entire period, and Latvia showed some fluctuations ranging from a sharp decline to a dramatic increase. All countries showed very high scores, namely, above 80, showing that they almost have reached the target.

Figure 1

Green Growth Index for the Baltic States During the 2010-2022 Period



Source: Global Green Growth Institute, 2023

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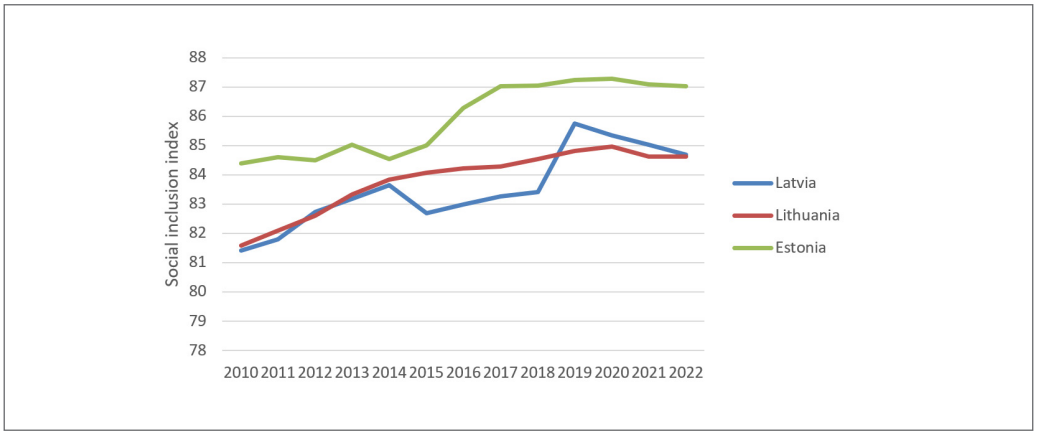
Figure 2

Dynamics of Scores for Social Inclusion Dimension in the Baltic States during 2010-2022



Source: Global Green Growth Institute, 2023

In Figure 3 the scores according to the natural capital protection dimension were compared in Baltic states during the 2010-2022 period.

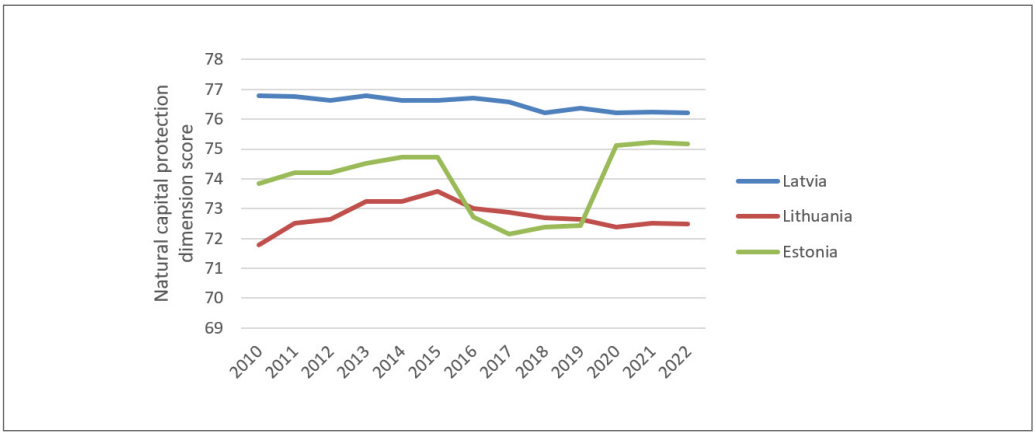
One can notice from the data plotted in Figure 2 that during the entire investigated period, Estonia was the best-performing country according to the social inclusion dimension of green growth. At the same time, Latvia and Lithuania showed very similar progress according to social inclusion in green growth from 2010 to 2022, though the path was quite different. Lithuania showed almost continuous growth in social inclusion during the entire period, and Latvia showed some fluctuations ranging from a sharp decline to a dramatic increase. All countries showed very high scores, namely, above 80, showing that they almost have reached the target.

In Figure 3 the scores according to the natural capital protection dimension were compared in Baltic states during the 2010-2022 period.

Information presented in Figure 3 shows that according to the natural capital protection dimension of green growth, Latvia was the leading country during the entire investigated period. Since 2015, in Lithuania, the natural capital protection score has declined. Es-

Figure 3

Dynamics of Scores for Natural Capital Protection Dimension in the Baltic States during 2010-2022



Source: Global Green Growth Institute, 2023

tonian natural capital protection dimension score had declined in 2025, but since 2017, it started to grow dramatically; however, it did not reach Latvia's position in 2022. Therefore, in 2022 there were obvious differences among Baltic States in achievements according natural capital protection dimension of green growth. A score above 70 means high scores and indicates that all Baltic States are taking a strategic position to completely reach the target.

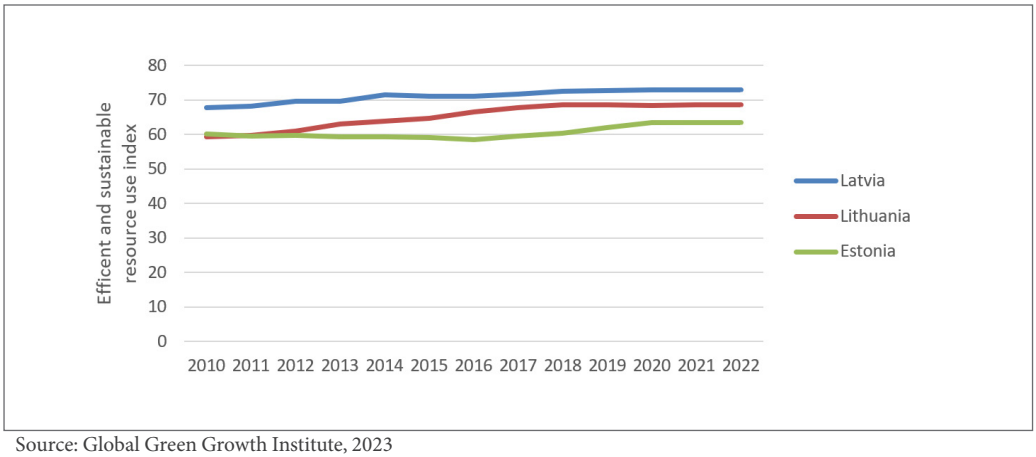
In Figure 4 the scores according to efficient and sustainable resource use dimension of green growth were compared in Baltic states during the 2010-2022 period.

As one can notice from Figure 4, Latvia was the best-performing country among the Baltic States according to the efficient and sustainable resource use dimension during 2010-2022. At the same time, Estonia was the worst-performing country during the entire period, though in 2010, the country had the same score for this dimension as Lithuania. However, Lithuania showed slightly better progress during the investigated period in comparison to Estonia. A score above 60 is a high score and indicates that countries are taking a strategic position to completely reach the target.

In Figure 5 the scores according to the green economic opportunities dimension were compared in Baltic states during the 2010-2022 period.

Figure 4

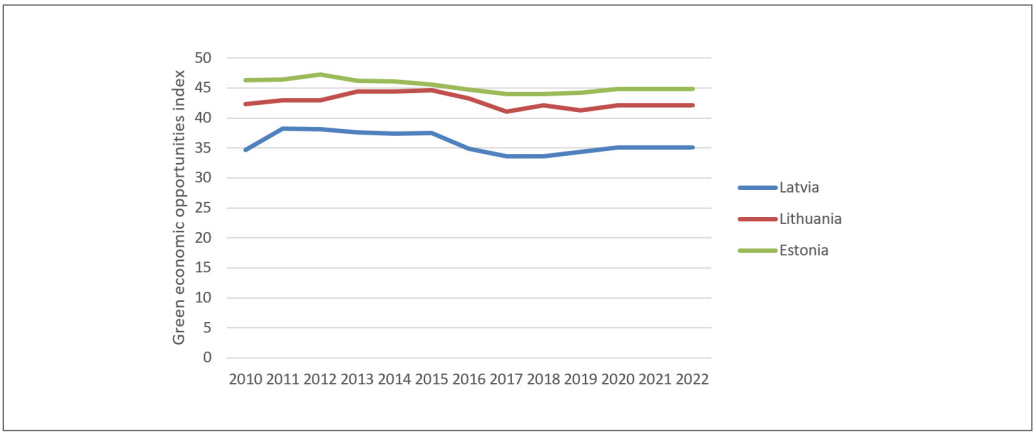
Dynamics of Scores for Efficient and Sustainable Resource Use Dimension in the Baltic States during 2010-2022



Source: Global Green Growth Institute, 2023

Figure 5

Dynamics of Scores for Green Economic Opportunities Dimension in the Baltic States during 2010-2022



Source: Global Green Growth Institute, 2023

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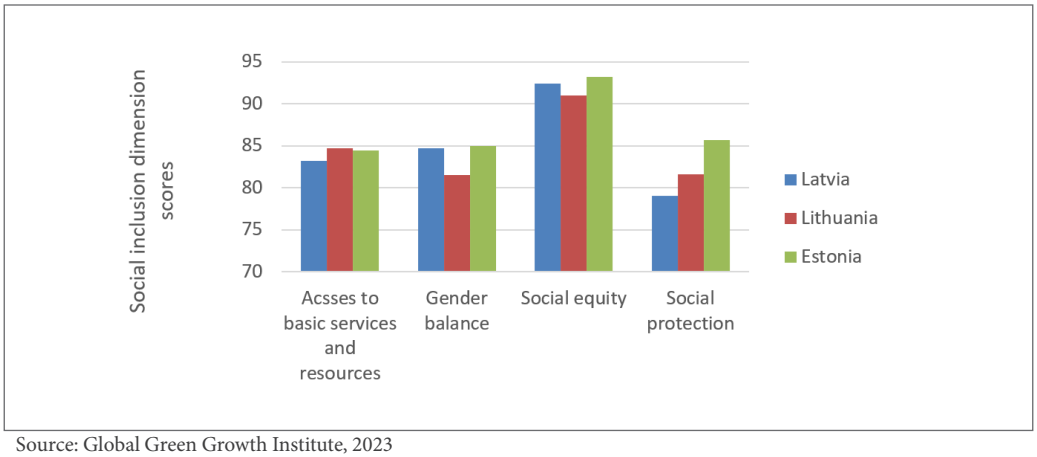
It can be seen from Figure 5 that during the entire period, Estonia was the leading country among the Baltic States according to the green economic opportunities dimension of green growth. Latvia was the lagging country during the analyzed period according to the green economic opportunities dimension. A score below 40 for Latvia is a low score identifying that the country has selected the right policies to align development toward achieving the target. For Lithuania and Estonia, the score is above 40 or moderate score, showing that the country is finding the right balance to move forward and avoid moving away from the target. In Figure 6 the comparison of scores for the social inclusion dimension according to four categories in 2022 is given for Baltic States.

One can see from Figure 6 that in 2022 Estonia obtained such a high score for the social security dimension of green growth due to high achievements in social equity and social protection. According to gender balance, Estonia received a similar score as Latvia, and according to access to basic services and resources the country was on the same level as Lithuania.

In Figure 7, the comparison of scores for the natural capital protection dimension according to four categories in 2022 is given for the Baltic States.

Figure 6

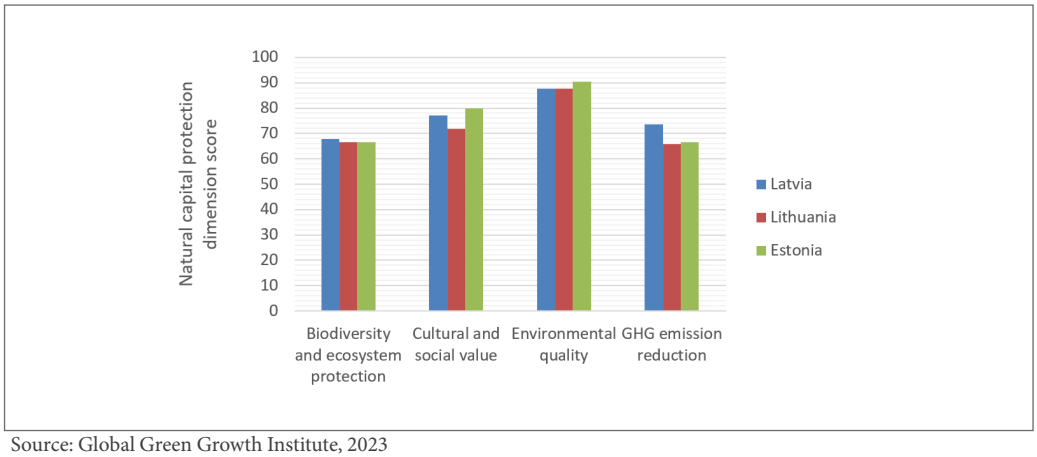
Decomposition of Social Inclusion Score According to Four Categories for the Baltic States in 2022



Source: Global Green Growth Institute, 2023

Figure 7

Decomposition of Natural Capital Protection Score According to Four Categories for the Baltic States in 2022



Source: Global Green Growth Institute, 2023

One can notice from Figure 7 that Latvia received the best position according to natural capital protection in 2022 due to the fact that the country was especially well-performing according GHG emission reduction category among other Baltic States as well as biodiversity and ecosystems protection though according to cultural and social value and environmental quality in 2022 the best results were shown by Estonia.

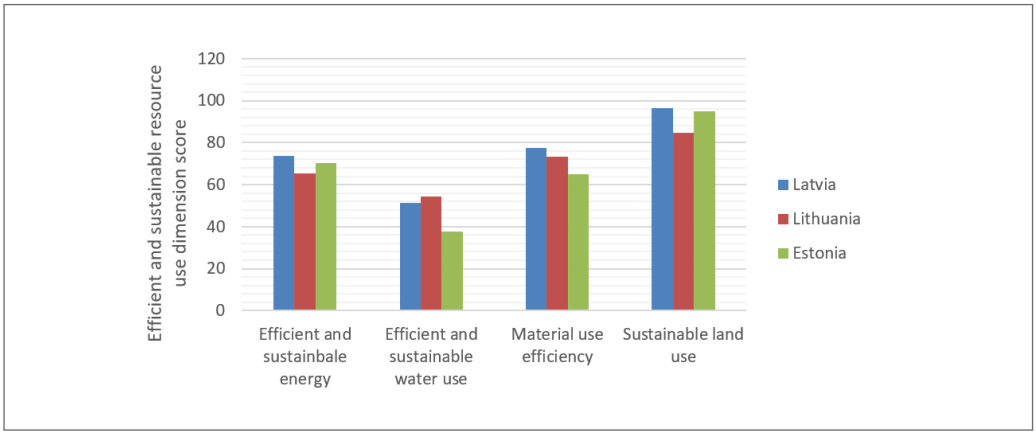
In Figure 8 comparison of scores for the efficient and sustainable resource use dimension according to four categories in 2022 is given for the Baltic States.

Data provided in Figure 8 shows that Latvia deserved the best position in terms of efficient and sustainable resource use among the Baltic States in 2022 due to the highest scores obtained for sustainable land use, material use efficiency, and efficient and sustainable energy usage. According to one category- efficient and sustainable water usage the best-performing country in 2022 was Lithuania, and Latvia was just in the second-best position.

In Figure 9, a comparison of scores green economic opportunities dimension according to four categories in 2022 is given for the Baltic States.

Figure 8

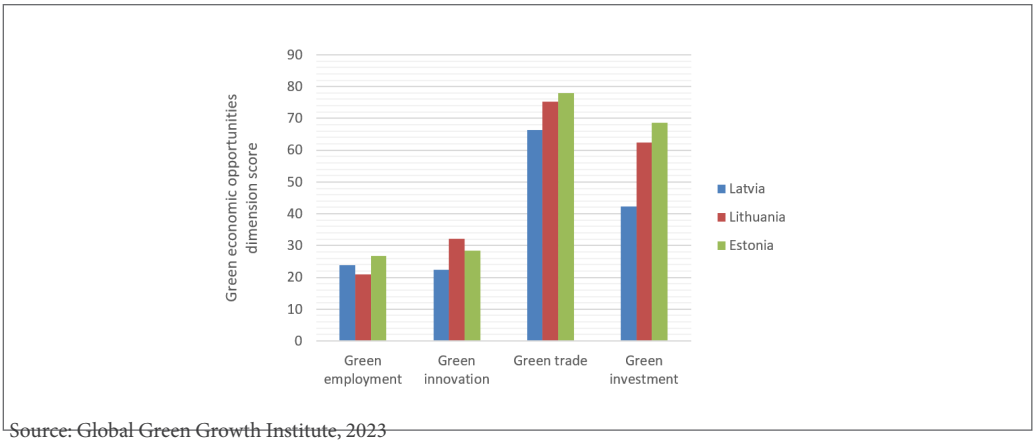
Decomposition of Efficient and Sustainable Resource Use Score According to Four Categories for the Baltic States in 2022



Source: Global Green Growth Institute, 2023

Figure 9

Decomposition of Green Economic Opportunities Score According to Four Categories for the Baltic States in 2022



Source: Global Green Growth Institute, 2023

As one can notice from Figure 9, the leading position of Estonia in 2022 according to green economic opportunities among the Baltic States was achieved due to the highest results in green investments, green trade, and green employment. According to the green innovation category, Lithuania achieved better results in 2022.

5. Conclusions

Green growth and sustainable development are seen as related pillars of industrialization and economic growth. Developed countries are pursuing green growth strategies to ensure sustainable development pathways, including climate change mitigation commitments and transitions towards carbon-neutral economies and societies.

There are various systems and frameworks developed to measure progress towards green growth; however, due to the lack of harmonized approaches and reliable data, most frameworks are difficult to apply for comparison and ranking of countries based on their achievements in green growth.

The green growth index applied for comparative assessment of Baltic States in terms of green growth achievements based on four main dimensions (social inclusion, efficient and sustainable resource use, natural capital protection, and green growth opportunities) showed that countries achieved good results (high and very high scores) for almost all dimensions except for green economic opportunities, as Latvia's score for this dimension of green growth was low. Lithuania's and Estonia's were moderate in 2022.

Though the Baltic States share similar geographical, political, and economic conditions, the analysis of green growth pathways in these countries is quite different according to different dimensions of green growth, the different countries are leading or lagging.

The comparative assessment of the Baltic States' achievements in green growth during 2010-2022 based on the green growth index showed that Estonia had been the leading country and Latvia the worst-performing country from 2018 until 2022.

Estonia distinguishes itself among the Baltic states with the best results according to two dimensions of green growth- social inclusion and economic green opportunities. At the same time, Latvia distinguishes with the best results achieved according to natural capital protection and efficient and sustainable resource use. Lithuania was ranked in the middle according to all dimensions of green growth during the investigated period, and based on the total green growth index value, the country was ranked in the middle between Estonia and Latvia. Therefore, though Latvia was very well performing according to two dimensions of green growth, the country obtained a lower ranking than Lithuania according to the entire green growth index due to its worst results achieved in ranking according to social inclusion and green economic opportunities dimensions.

Estonia obtained the highest score for the social security dimension of green growth due to the highest achievements in social equity and social protection. Also, Estonia received the highest position according to green economic opportunities due to the highest results in green investments, green trade, and green employment.

Latvia received the best position in natural capital protection because the country was especially well-performing in terms of GHG emission reduction, biodiversity, and ecosystem protection. Also, Latvia obtained the best position regarding efficient and sustainable resource use dimension due to the highest scores obtained for sustainable land use, material use efficiency, and efficient and sustainable energy usage.

The conducted assessment allows us to find weaknesses and strengths in the green growth of the Baltic States region and to formulate policy priorities for countries. For Latvia, the main attention for promoting green growth should be placed on promoting green investments, green innovations, and green trade, as well as focusing on social protection and access to basic services and resources.

For Estonia, policies to promote green growth should prioritize material use efficiency, efficient and sustainable water, and energy resource usage, and GHG emission reduction. For Lithuania, the most important to ensure green growth is to develop policies and measures to ensure green employment, sustainable land use, efficient and sustainable energy use, and promote social equity and gender balance.

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