



RIBES

REGIONAL INCLUSIVE BIOBASED
ENTREPRENEURSHIP SOLUTIONS

DELIVERABLE 4.1

Appraisal of governance practices in circular bioeconomy and social innovation in RIBES regions

Inessa Prozorova
(BIOCOM)

13 October 2025



Funded by
the European Union

PROJECT INFORMATION

PROGRAMME	Horizon Europe – RIA
TOPIC	HORIZON-CL6-2023-GOVERNANCE-01-5 - Revitalisation of European local (rural / peri-urban) communities with innovative bio-based business models and social innovation
TYPE OF ACTION	HORIZON Research and Innovation Actions
PROJECT NUMBER	101134911
START DAY	1 March 2024
DURATION	36 Months

DOCUMENT INFORMATION

TITLE	Appraisal of governance practices in circular bioeconomy and social innovation in RIBES regions
WORK PACKAGE	WP4 – Co-development of transformative governance approaches
TASK	Task 4.1 – Appraisal of governance practices in the nexus of circular bioeconomy and social innovation in RIBES participating regions
AUTHORS (ORGANISATION)	Inessa Prozorova (BIOCOM)
REVIEWERS	RIBES Project Partners
DATE	13.10.2025

DISSEMINATION LEVEL

PU	Public, fully open	x
SEN	Sensitive, limited under the conditions of the Grant Agreement	
CLASSIFIED R-UE/EU-R	EU RESTRICTED under the Commission Decision No2015/444	
CLASSIFIED C-UE/EU-C	EU CONFIDENTIAL under the Commission Decision No2015/444	
CLASSIFIED S-UE/EU-S	EU SECRET under the Commission Decision No2015/444	

DOCUMENT HISTORY

VERSION	DATE	CHANGES	RESPONSIBLE PARTNER
1.0	18/08/2025	First draft	Inessa Prozorova (BIOCOM)
1.1	25/08/2025	Review	RIBES Project Partners
1.2	29/08/2025	Second draft	Inessa Prozorova (BIOCOM)
1.3	13/10/2025	Final version: revision of executive summary, introduction and method, restructuring of results section, inserting conclusion and outlook section	Inessa Prozorova (BIOCOM)

LEGAL NOTICE

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

© **RIBES, 2025**

Regional Inclusive Biobased Entrepreneurship Solutions

TABLE OF CONTENTS

EXECUTIVE SUMMARY	6
1. INTRODUCTION.....	9
2. CONCEPTUAL FRAMEWORK.....	11
3. METHODOLOGY AND DATA	12
3.1 Performance Indicators.....	12
3.1.1 Governance Dimension	14
3.1.2 Economic Dimension	25
3.1.3 Social Dimension	27
3.2 Self-Assessment	31
3.3 Data Sources	31
3.4 Data Analysis	34
4. ASSESSMENT OF EXISTING GOVERNANCE PRACTICES	35
4.1 Plovdiv, Bulgaria.....	36
4.1.1 Socio-Economic Profile	36
4.1.2 Self-assessment of Existing Governance Practices.....	39
4.1.3 SWOT Analysis of Existing Governance Practices	42
4.2 North Aegean, Greece.....	44
4.2.1 Socio-Economic Profile	45
4.2.2 Self-assessment of Existing Governance Practices.....	46
4.2.3 SWOT Analysis of Existing Governance Practices	48
4.3 Pannonian Croatia, Croatia	50
4.3.1 Socio-Economic Profile	50
4.3.2 Self-assessment of Existing Governance Practices.....	52
4.3.3 SWOT Analysis of Existing Governance Practices	54
4.4 Campania, Italy	56
4.4.1 Socio-Economic Profile	57
4.4.2 Self-assessment of Existing Governance Practices.....	58
4.4.3 SWOT Analysis of Existing Governance Practices	60
4.5 Western Balkans	62
4.5.1 Socio-Economic Profile	63
4.5.2 Self-assessment of Existing Governance Practices.....	64

4.5.3 SWOT Analysis of Existing Governance Practices	66
4.6 Podkarpackie, Poland	68
4.6.1 Socio-Economic Profile	68
4.6.2 Self-assessment of Existing Governance Practices	70
4.6.3 SWOT Analysis of Existing Governance Practices	72
4.7 Sibiu, Romania	75
4.7.1 Socio-Economic Profile	75
4.7.2 Self-assessment of Existing Governance Practices	77
4.7.3 SWOT Analysis of Existing Governance Practices	80
4.8 Vojvodina, Serbia	82
4.8.1 Socio-Economic Profile	82
4.8.2 Self-assessment of Existing Governance Practices	84
4.8.3 SWOT Analysis of Existing Governance Practices	86
4.9 Nitra, Slovakia	88
4.9.1 Socio-Economic Profile	89
4.9.2 Self-assessment of Existing Governance Practices	90
4.9.3 SWOT Analysis of Existing Governance Practices	92
4.10 Carpathian Region, Ukraine	94
4.10.1 Socio-Economic Profile	94
4.10.2 Self-assessment of Existing Governance Practices	96
4.10.3 SWOT Analysis of Existing Governance Practices	99
5. CONCLUSION	101
5.1 Good Governance Practices	101
5.2 Governance Challenges	101
5.3 Future Areas of Action	102
6. OUTLOOK	103
7. LITERATURE	104
8. ANNEX A	109

LIST OF FIGURES

Figure 1: Map of provinces in Bulgaria.	36
Figure 2: Assessment of existing governance practices in Plovdiv, Bulgaria.	41
Figure 3: Map of administrative regions in Greece.	44
Figure 4: Assessment of existing governance practices in North Aegean, Greece.	47
Figure 5: Map of NUTS 2 subdivisions in Croatia.	50
Figure 6: Assessment of existing governance practices in Pannonian Croatia, Croatia.	53
Figure 7: Map of NUTS 2 subdivisions in Italy.	56
Figure 8: Assessment of existing governance practices in Campania, Italy.	59
Figure 9: Map of six Western Balkan countries.	62
Figure 10: Assessment of existing governance practices in the Western Balkans.	65
Figure 11: Map of NUTS 2 subdivisions in Poland.	68
Figure 12: Assessment of existing governance practices in the Podkarpackie, Poland.	72
Figure 13: Map of counties in Romania.	75
Figure 14: Assessment of existing governance practices in Sibiu, Romania.	79
Figure 15: Map of NUTS 2 subdivisions in Serbia.	82
Figure 16: Assessment of existing governance practices in the Vojvodina, Serbia.	85
Figure 17: Map of NUTS 3 subdivisions in Slovakia.	88
Figure 18: Assessment of existing governance practices in Nitra, Slovakia.	91
Figure 19: Map of oblasts in Ukraine.	94
Figure 20: Assessment of existing governance practices in the Carpathian Region, Ukraine.	98

LIST OF TABLES

Table 1: Overview of key performance indicators.	15
Table 2: Levels of engagement according to the Voice and Accountability indicator.	16
Table 3: Levels of market functionality according to the Regulatory Quality indicator.	17
Table 4: Levels of governance functionality according to the Regulatory Quality indicator.	18
Table 5: Levels of legal stability according to the Rule of Law indicator.	19
Table 6: Levels of effectiveness according to the Control of Corruption indicator.	20
Table 7: Levels of risk management according to the Governance of Bioeconomy Risks indicator.	21
Table 8: Levels of strategy fulfillment according to the Strategic Objectives of Regional Bioeconomy indicator.	23
Table 9: Levels of the External Support for Regional Bioeconomy indicator.	24
Table 10: Bioeconomy Sectors (based on Eurostat, 2025 and Ronzon & M'Barek, 2018)	33

ABBREVIATIONS

CBE	Circular Bioeconomy
EC	European Commission
EU	European Union
EUROSTAT	European Statistical Office
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GRP	Gross Regional Product
GVA	Gross Value Added
MTF	Multi-Actor Transformative Forum
NACE	Nomenclature Générale des Activités Économiques dans les Communautés Européennes
NEET	Neither in Employment, Education, nor Training
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organization for Economic Co-operation and Development
S-LCA	Social Life Cycle Assessment
SDG	Sustainable Development Goal
SME	Small and Midsize Enterprise
TP	Transformation Path
VET	Vocational Education and Training
WGI	World Governance Indicators
WP	Work Package

EXECUTIVE SUMMARY

The EU-funded project “Regional Inclusive Biobased Entrepreneurship Solutions” (RIBES) aims to enhance the uptake of biobased innovations in ten European regions lagging in innovation by developing and implementing innovative governance and business models that combine the principles of the circular bioeconomy, social innovation, and rural development. This Deliverable (D4.1) presents the results of Task 4.1 “*Appraisal of governance practices in the nexus of circular bioeconomy (CBE) and social innovation in RIBES participating regions.*” The analysis provides a comparative assessment of existing governance structures and practices in the ten European regions participating in the RIBES project. The findings serve as a foundation for the co-development of inclusive and effective governance toolkits (Task 4.3) and the formulation of evidence-based policy recommendations (Task 4.4).

The study adopts a multi-dimensional indicator framework, focusing on three main pillars: governance, social, and economic dimensions. It combines desk research, secondary data analysis, and self-assessment exercises conducted through the Multi-Actor Transformative Forums (MTFs) in each region. The analysis evaluates regional governance performance across governance indicators and socio-economic metrics.

Across the RIBES regions, several good governance practices have been identified. These include strong academic and research involvement in regional innovation systems and the effective utilization of EU and national funding instruments. These practices demonstrate an increasing institutional awareness of the importance of inclusive, transparent, and adaptive governance for accelerating the transition toward a circular bioeconomy.

However, the study also highlights persistent governance challenges, including fragmented institutional coordination, limited stakeholder participation, administrative inefficiency, weak control of corruption, and insufficient risk governance mechanisms. In many regions, the absence of integrated bioeconomy strategies hampers long-term planning and cross-sectoral coherence.

To strengthen governance capacity and foster transformation, three key action fields are identified:

1. Developing integrated and coherent regional bioeconomy strategies that align with EU policy frameworks and local priorities;
2. Institutionalizing participatory and transparent governance mechanisms that empower local actors and social enterprises; and
3. Building institutional capacity and risk governance systems that support resilience and accountability.

The findings of this deliverable form a strategic foundation for the subsequent steps of Work Package 4. They directly inform the co-development of regional governance toolkits (Task 4.3), support MTFs in their participatory design processes, and provide an analytical basis for the policy briefs to be developed in Task 4.4. Through these contributions, WP4 plays a pivotal role in achieving RIBES’ overarching objective: fostering a sustainable and resilient circular bioeconomy across Europe’s rural and peri-urban regions.

1. Introduction

The transition toward a circular bioeconomy (CBE) represents a fundamental shift in how societies produce, consume, and govern the use of biological resources, processes, and principles. It requires not only technological innovation but also institutional transformation and social inclusion. Effective governance, therefore, not only sets the stage for innovation but also provides the institutional stability needed to coordinate stakeholders, reduce uncertainty, and ensure an equitable distribution of benefits (D'Adamo et al., 2020; Dietz et al., 2018; Gawel et al., 2016).

The EU-funded project *Regional Inclusive Biobased Entrepreneurship Solutions (RIBES)* addresses this challenge by promoting innovative and socially inclusive bio-based business models and innovative governance approaches that strengthen local economies and communities across ten European regions.

Work Package 4 (WP4) plays a central role in this endeavor by developing governance solutions that enhance the inclusiveness, transparency, and effectiveness of regional bioeconomy systems. Within this framework, Task 4.1 aims to establish a solid empirical and conceptual foundation for understanding how governance structures, institutional arrangements, and decision-making processes influence the CBE transition. The outcomes of this task serve as a baseline for co-developing governance toolkits and policy frameworks in later stages of the project.

This deliverable presents an appraisal of existing governance practices in the RIBES regions. It examines how current institutional setups enable or constrain circular bioeconomy development and identifies both exemplary practices and critical governance gaps. The analysis integrates quantitative data—such as performance indicators on governance, social, and economic dimensions—with qualitative insights from regional self-assessments conducted through the Multi-Actor Transformative Forums (MTFs).

The methodology follows a multi-actor, participatory, and place-based approach, reflecting RIBES' guiding principles of inclusiveness and contextual adaptation. By involving local stakeholders, the assessment captures diverse perspectives and ensures that the identified challenges and solutions are rooted in local realities.

The results contribute directly to three key objectives of WP4:

- providing empirical evidence for the co-development of governance toolkits under Task 4.3,
- supporting the co-creation processes within MTFs, and
- informing the policy briefs to be elaborated under Task 4.4 to promote effective governance frameworks at the EU and national levels.

By combining analytical depth with participatory engagement, this deliverable lays the groundwork for strengthening governance structures that support an inclusive, sustainable, and resilient bioeconomy across the RIBES regions. It thus contributes to RIBES' overarching mission: empowering European rural and peri-urban areas through circular innovation, social entrepreneurship, and transformative governance.

The structure of this report is organized as follows: Section 2 describes the conceptual framework, methodology, and data sources. Section 3 provides region-specific evaluations of existing governance

practices, analyzing institutional governance and socio-economic indicators across the RIBES regions. Each regional case study offers insights into local strengths and weaknesses, and provides an overview of future key areas of action. The report concludes by synthesizing these findings to guide the development of governance solutions within WP4 and to support the broader RIBES goal of promoting inclusive, sustainable, and resilient circular bioeconomy pathways in Europe's rural regions.

2. Conceptual Framework

The present study is based on the findings of the extensive literature review conducted as part of RIBES Deliverable 2.1, which aimed to examine the nexus between the circular bioeconomy and the social economy for the sustainable transformation of rural areas in Europe and globally. The results of the study show that these are largely separate but complementary fields of research that share common goals such as sustainability and participatory development. The review also demonstrates that social innovation is pivotal to ensuring the bioeconomy is sustainable, inclusive, and regionally anchored (Wintjes et al., 2025).

The conceptual framework of this study is based on the critical understanding of the bioeconomy and social innovation developed in Deliverable 2.1. According to this understanding, both concepts are considered to be highly context-specific and locally influenced. Rather than adopting fixed or universal definitions, the RIBES project recognizes that regional priorities, local practices, and stakeholder ambitions shape both fields. Within this perspective, the bioeconomy concept involves using biological resources, knowledge, and processes to create sustainable economic and societal systems. It goes beyond merely replacing fossil resources with renewable alternatives and requires systemic changes in technology, economy, and social structures. Initially rooted in biotechnology advancements, it now serves as a policy framework aiming for ecological sustainability, economic innovation, and social equity. It is situated at the intersection of technology, society, and ecology, emphasizing the need for place-based strategies that address the complexity of rural systems.

Social innovation, similarly, is defined as a highly contextual, participatory, and experimental process that mobilizes local knowledge, inclusive decision-making, and multi-actor collaboration to respond to sustainability challenges. It plays a critical role in shaping pathways for rural transformation, supporting regions in analyzing societal problems, negotiating trade-offs, and identifying locally relevant solutions. By fostering adaptive governance, cross-sectoral collaboration, and scalable innovation models, social innovation provides a foundation for building transformative capacity in rural bioeconomies.

The conceptual framework developed within the RIBES Task 2.1 adopts a Multi-Level Perspective to explore transformation processes across niche, regime, and landscape levels, emphasizing the co-evolution of technology, society, and ecology. The RIBES approach prioritizes multi-actor partnerships and platform-based collaboration, such as MTFs, as mechanisms for co-designing and implementing context-specific, place-based solutions. This methodology seeks to move beyond single-value economic production toward multi-value creation and composite value delivery, enabling a socio-ecological regime shift that fosters rural regeneration. In doing so, the project advances a systemic understanding of innovation as a locally grounded, participatory, and transformative process, bridging bioeconomic and social innovation frameworks to deliver sustainable outcomes tailored to diverse regional contexts.

Building on these findings, the RIBES multi-actor partnerships were mobilized for the present study to identify and highlight governance dynamics in the RIBES regions.

3. Methodology and Data

The analysis of bioeconomy governance aspects constitutes a relatively novel research topic within the domain of bioeconomy research. Consequently, an exploratory approach was adopted, utilizing a mixed method approach that combines desk research, analysis of Work Package (WP) 2 results, and active engagement with local partners and Multi-Actor Transformative Forum (MTF) stakeholders to gain a comprehensive understanding of regional governance structures in the circular bioeconomy (CBE) and social innovation nexus in the RIBES participating regions.

3.1 Performance Indicators

Indicators are vital tools for measuring and explaining progress toward specific goals and for supporting evidence-based decision-making in public governance. Essentially, an indicator is a performance measure that highlights particular features of a system, offering insights into the level of progress or discrepancies from an expected state. However, their interpretation requires context: performance indicators only have meaning when compared to benchmarks, integrated within governance frameworks, and understood in relation to broader socio-economic and institutional factors. In this way, they not only monitor performance but also act as early warning signs and strategic planning tools for government and public administration. Using indicators for monitoring plays a crucial role in promoting and adjusting sustainable development and growth across all levels of sustainability (Feller-Länzlinger et al., 2020; Marchi et al., 2017; Schedler, 2004).

In the context of the CBE, indicators can be used at different levels of analysis. At the macro level, they measure regional or national bioeconomy development; at the meso level, they assess collective systems, such as eco-industrial parks; and at the micro level, they focus on individual products, companies, or consumer behaviors (Vural Gursel et al., 2023). This report focuses on the regional macro level, reflecting RIBES' main goal of evaluating governance practices during the transition to a sustainable bioeconomy across participating regions.

Indicators provide a systematic approach to monitoring the transition to a bioeconomy, enabling policymakers and stakeholders to assess progress, identify challenges, and set actionable goals. Because there are no standardized indicators for circular bioeconomy governance, this report creates context-specific ones. Their selection is guided by established quality criteria: relevance to the application context, validity in measuring the intended targets, and consistency across repeated measurements. Additional principles include traceability, transparency, clarity, and a focus on quantifiability supported by high-quality, openly accessible data. Stakeholder participation is equally vital, ensuring that the indicators are both practical and legitimate within local and regional governance settings (Feller-Länzlinger et al., 2020; Kardung et al., 2021).

Following sustainability assessment principles, the analysis is organized around three interconnected pillars: governance, social, and economic dimensions (Diaz-Chavez, 2014; Diaz-Chavez et al., 2019). For this report, governance indicators are the main focus, as they directly reflect regional policy and institutional practices. Social and economic indicators are included as supplementary dimensions, offering insights into conditions that enable or hinder bioeconomy development. While environmental sustainability is inherently central to the bioeconomy, its assessment is less directly affected by regional governance arrangements and is therefore considered only as supportive in this analysis.

Effective governance indicators share several key features. They must be relevant to the system in question, easy to understand without needing expert intervention, reliable and valid in measurement, based on accessible data, cost-effective, and responsive to both temporal and spatial scales. More recent research highlights that sustainable bioeconomy development depends not only on technological or market factors but also on existing social, economic, and institutional conditions that the bioeconomy alone cannot create. Therefore, comprehensive governance frameworks are increasingly seen as essential for guiding bio-based transformations in a sustainable and inclusive way (Dahl, 2012; Dietz et al., 2018).

The indicators developed in this study mainly come from scientific literature and depend on open-access data sources. However, limitations in data coverage and comparability mean that some parts of bioeconomy governance cannot be measured exactly. This highlights the need for continuous improvement of indicator frameworks alongside better data infrastructure.

By using a structured, indicator-driven approach, this report aims to give policymakers practical insights into both opportunities and challenges in regional bioeconomy governance. Such an approach not only supports adaptive governance and policy learning but also helps in creating evidence-based strategies for building sustainable, socially inclusive, and economically viable bio-based futures (D'Adamo et al., 2020).

3.1.1 Governance Dimension

The importance of governance in the context of circular bioeconomy and bio-based innovations is significant, as practical strategies and policies can lead to a sustainable transformation. Establishing and applying suitable legal frameworks and regulations is crucial because strong institutional structures are linked to improved bioeconomy performance. Similarly, within innovation systems, institutional structures are fundamental to supporting and guiding technological progress. Therefore, the goal of examining performance indicators in the RIBES regions is to evaluate the effectiveness and inclusiveness of governance practices related to CBE and social innovation.

Analyzing the perceived quality of governance is a vital part of the RIBES project, as it can influence the actions of stakeholders and shape the regional approach toward a bioeconomy. We aim to measure and assess governance practices in the RIBES regions to enable bioeconomy-oriented policymaking. In this context, political activities can be classified as either *enabling governance*, which promotes the development of a bioeconomy, or *constraining governance*, which hinders the transition through its policies. Numerous enabling governance mechanisms exist, and these should be customized to the characteristics of the RIBES regions (Barra & Falcone, 2024; Dietz et al., 2018; Jander et al., 2020; Kaufmann & Kraay, 2024; Nelson & Nelson, 2002).

Institutional management quality is crucial for investments in bioeconomy, which serves as a highly effective tool for bioeconomic transformation tailored to regional conditions. Regional policy frameworks have the potential to boost economic growth, remove investment barriers, and create an environment conducive to investing in bio-based industries. This is especially true for countries with low bioeconomy performance so far and highlights the importance of higher institutional quality as a catalyst for bioeconomic transformation (Barra & Falcone, 2024; Bößner et al., 2021; Dietz et al., 2018; Kardung et al., 2021; Woźniak et al., 2021).

According to Barra & Falcone (2024), the World Bank's World Governance Indicators (WGI), which measure the perceived quality of governance worldwide, are utilized for the self-assessment of the RIBES regions. Respondents' self-assessment serves as a credible method for governance indicators because it is more difficult to manipulate than objective measures and less likely to be influenced by targeted political shifts. The WGI consists of six governance indicators, making them appropriate for self-assessment because they address aspects of governance that are difficult to quantify and reveal the gap between government policies and their implementation. Nonetheless, the existing database is limited to the national level, and more detailed WGI data is not available for the RIBES regions (Kaufmann & Kraay, 2024; World Bank, 2025).

For the RIBES project governance indicators, Voice and Accountability, Regulatory Quality, Government Effectiveness, Rule of Law, Control of Corruption, Governance of Bioeconomy Risks, Strategic Objectives of Regional Bioeconomy, and External Support for Regional Bioeconomy were chosen for self-assessment evaluation by the MTFs. The first five indicators are derived from the WGI. The WGI indicator, Political Stability, was intentionally not included, as the current geopolitical instability in Europe would likely reduce the usefulness of this indicator. Because of their broad scope, the WGI indicators do not explicitly address bioeconomy activities. The last three indicators of the self-assessment directly relate to the status of politically driven bioeconomic efforts in the RIBES regions. Unlike previous surveys, the indicators for the RIBES self-assessment were rated on a four-point ordinal scale. This method presents complex and abstract topics in a simple, user-friendly format, improving

response comparability. The asymmetric four-point scale prevents respondents from focusing on average scores, enabling the identification of trends.

An overview of the eight key governmental performance indicators is presented in [Table 1](#).

Table 1: Overview of key performance indicators.

OVERVIEW: KEY PERFORMANCE INDICATORS	
VOICE AND ACCOUNTABILITY	Effectiveness of citizen participation in government processes and existence of civil rights, including freedom of expression.
REGULATORY QUALITY	Existence of an efficient regulatory framework in terms of efficient policy implementation and effective regulations.
GOVERNMENT EFFECTIVENESS	Performance and quality of the public sector including public services, infrastructure, and public affairs.
RULE OF LAW	Functionality and stability of legal systems including effectiveness of the judiciary and law enforcement agencies.
CONTROL OF CORRUPTION	Severity of and efforts to combat abuse of power by public officials for private financial gain or interests.
GOVERNANCE OF BIOECONOMY RISKS	Extent of political measures to manage risks and trade-offs in the bioeconomy.
STRATEGIC OBJECTIVES OF REGIONAL BIOECONOMY	Existence and implementation of regional bioeconomy strategies and objectives.
EXTERNAL SUPPORT FOR REGIONAL BIOECONOMY	Effectiveness and scope of external support measures for regional bioeconomy development.

3.1.1.1 *Voice and Accountability*

The Voice and Accountability indicator assesses the perceived effectiveness of citizen participation and the presence of civil rights in a society. Key aspects include free and fair elections, freedom of expression and association, independent media, human rights, and freedom of demonstration. To gain acceptance and legitimacy for political actions aimed at transitioning to a bioeconomy, the active involvement of all stakeholders in decision-making is essential. Well-structured participatory processes and transparent decision-making are crucial in this regard. A significant element is inclusive governance, which fosters a political environment that involves all relevant stakeholders (Barra & Falcone, 2024; Dietz et al., 2018; El-Chichakli et al., 2016; Kaufmann & Kraay, 2024; Marcone et al., 2022; Pyka, 2017).

Effective citizen participation has shown a significant impact on the performance of the bioeconomy, which underlines the strong relevance of this indicator. However, the relationship between the indicator and the performance of the bioeconomy does not appear to be monotonic under all conditions. In an unstable political environment and with unstable institutions, an initial increase in citizen participation could become an obstacle for the bioeconomy. The more mature the governance structures are, the greater the positive effect of Voice and Accountability on the bioeconomy appears to be (Barra & Falcone, 2024; D'Adamo et al., 2020).

The levels of engagement are based on the World Bank's Worldwide Governance Indicators (World Bank, 2025) and rank participation opportunities from minimal engagement to the full involvement of all relevant stakeholders in the decision-making process ([Table 2](#)).

Table 2: Levels of engagement according to the Voice and Accountability indicator.

VOICE AND ACCOUNTABILITY: LEVELS OF ENGAGEMENT			
LIMITED ENGAGEMENT AND RESTRICTED FREEDOM	EMERGING ENGAGEMENT WITH INSTITUTIONAL BARRIERS	STRUCTURED PARTICIPATION WITH GROWING INFLUENCE	HIGH CITIZEN PARTICIPATION AND STRONG ACCOUNTABILITY
Stakeholders and citizens are not involved or are only involved to a very limited extent	Individual stakeholders or interested groups are occasionally consulted.	Broad stakeholder participation with regulated feedback mechanisms.	Stakeholders and citizens are actively involved in the design and implementation of the bioeconomy strategy.
Decisions are mainly made top-down.	Transparency of the participation process is limited.	Decisions are transparent, albeit with restrictions.	Participation takes place on an equal footing with transparent, long-term decision-making mechanisms
There are no structured dialogue formats or transparent decision-making processes.	Dialogue formats exist but are irregular and not structured.	Structured formats, e.g., workshops and dialogue forums enable co-design.	There are clear co-determination rights that are institutionally anchored.
Limited freedom of opinion and few opportunities for political participation.	Citizens' influence is limited due to decision-making structures that are not very participatory.	Citizens have increasing opportunities to get politically involved and influence political processes.	Political participation is high, and citizens can actively exert influence.

3.1.1.2 Regulatory Quality

An effective and efficient regulatory framework plays a crucial role in promoting bioeconomic innovations (Horbach, 2008). Therefore, the indicator Regulatory Quality assesses the perceived ability of the government to establish and enforce strong policies and regulations that stimulate and support the private sector. This includes examining barriers to market entry (such as price controls, tariffs, taxes, or insufficient banking oversight), the efficiency of trade-related policies, and the stability of financial sectors and markets. Restrictive regulations and associated risks can hinder the creation or continuation of business activities. The importance of this indicator for developing the bioeconomy makes it clear that regulatory uncertainties can pose significant challenges for businesses, making it harder for existing companies to grow and for new ones to enter and invest in the region. Conversely, a well-functioning market can become a key driver in promoting environmental innovation. Furthermore, studies emphasize that functioning markets are vital for bioeconomy growth, as future market demand motivates sectors to encourage involvement in the bioeconomy (Barra & Falcone, 2024; El-Chichakli et al., 2016; Horbach, 2008; Kaufmann & Kraay, 2024; Wensing et al., 2019).

Consistent with the previous indicator, Voice and Accountability, Regulatory Quality significantly influences the performance of the bioeconomy. This is connected to effective, well-designed political regulations that support the private sector and create a favorable environment for innovation. A clear regulatory framework not only promotes innovation but also encourages investment, thereby supporting the further development of bioeconomy sectors (Barra & Falcone, 2024).

Table 3 presents the classification of this indicator into four levels, according to the World Bank (World Bank, 2025).

Table 3: Levels of market functionality according to the Regulatory Quality indicator.

REGULATORY QUALITY: LEVELS OF MARKET FUNCTIONALITY			
HIGHLY RESTRICTIVE MARKETS	PARTLY OPEN MARKETS	FUNCTIONAL MARKETS	OPEN AND COMPETITIVE MARKETS
High administrative hurdles for business owners and market entry of new players.	Market entry is possible but is associated with administrative hurdles.	Company foundation and market access are relatively non-complicated with clear regulatory processes.	Market entry is efficient, transparent, and possible without unnecessary hurdles.
Regulation is inconsistent, difficult to predict, or subject to political interests.	Regulation is partly efficient but with gaps or excessive bureaucracy resulting in market entry being subject to administrative hurdles.	Regulations are largely stable and predictable with only occasional problems or delays.	Regulations are clearly defined, consistent, and stable in the long term, providing planning security.
Price and market mechanisms are distorted by extensive state intervention (e.g., price and wage controls, excessive subsidies).	State intervention in prices and markets exists but is limited or sector dependent.	State intervention in the market is limited and generally serves to stabilize it.	The state only intervenes minimally in market mechanisms and creates fair competitive conditions.
The financial sector suffers from inadequate supervision and inefficient rules.	The financial sector is regulated but there are risks due to insufficient control or political influence.	The financial sector is well regulated and there are no serious risks from regulatory weaknesses.	The financial sector is stable, well-regulated and protects investors and consumers alike.

3.1.1.3 Government Effectiveness

Government Effectiveness, as a key metric, evaluates the performance and quality of the public sector. It is a comprehensive measure that assesses how well a government delivers public services, maintains infrastructure, and ensures stability and efficiency in public affairs. The indicator examines the extent to which political influences impact the administration, how reliably political strategies are developed and executed, and how the administration acts with integrity in these processes. This indicator, which emphasizes the efficiency of bureaucratic structures, the stability of the political system, and the independence of the public administration, affects investment attractiveness and the quality of life of citizens. Bioeconomic development depends on the performance of state institutions, as they form a vital pillar for economic growth and can play a decisive role in driving the shift toward a bioeconomy (Barra & Falcone, 2024; Dietz et al., 2018; Kaufmann & Kraay, 2024; Marcone et al., 2022).

An overview of the different levels of the Government Effectiveness indicator is shown in Table 4 (World Bank, 2025).

Table 4: Levels of governance functionality according to the Regulatory Quality indicator.

GOVERNMENT EFFECTIVENESS: LEVELS OF GOVERNANCE FUNCTIONALITY			
DYSFUNCTIONAL GOVERNANCE	DEVELOPING GOVERNANCE	STABLE AND FUNCTIONAL GOVERNANCE	TRANSPARENT AND EFFICIENT GOVERNANCE
The bureaucracy is inefficient and overly complex, hindering business activities and access to public services. Public and civil services are heavily influenced by political interests and a lack of professional independence.	Public administration shows some independence but is affected by political influence or corruption. Public and civil services are functional but hampered by inefficiencies, excessive bureaucracy, and inconsistent policy implementation.	Public administration and public services are professional, well-structured, and capable of implementing policies efficiently with streamlined bureaucratic procedures.	Public administration is highly competent, adaptable, and focused on long-term policy effectiveness, with minimal bureaucratic red tape.
Budget and financial management are weak, with resource misallocation and ineffective public spending.	Public budget and financial management are improved, but gaps in planning and spending efficiency persist.	Public budget and financial management ensure stable resource allocation, supporting economic and social development.	Public budget and financial management are optimized, ensuring sustainable investments in key sectors.
Basic services (e.g., education, healthcare, transport, and electricity) are unreliable and fail to meet the population's needs.	Economic actors can largely work within state framework conditions but must expect unpredictable changes and face administrative burdens.	State institutions create a predictable economic environment with clear and enforceable rules.	Education, healthcare, transport, and electricity systems operate at a high standard with efficient and citizen-friendly administrative processes.

3.1.1.4 Rule of Law

The Rule of Law indicator focuses on the legal system and its functionality. Trust in the system and compliance with social rules are the most critical elements of this indicator. To maintain a stable legal system, the independence and effectiveness of the judiciary and law enforcement agencies must be ensured. Therefore, the Rule of Law addresses issues related to public and corporate security. At the business level, aspects such as property rights (e.g., intellectual property, confiscation, or expropriation), the enforceability of contracts, and the costs associated with crime and violence significantly influence reliance on the legal system and the attractiveness of a location for business. Consequently, a strong Rule of Law builds investor confidence, which is essential for encouraging investments in the bioeconomy. At the civil level, this includes fair and transparent court proceedings, effective law enforcement, police reliability, and the crime rate (Barra & Falcone, 2024; Dietz et al., 2018; El-Chichakli et al., 2016; Kaufmann & Kraay, 2024).

The breakdown of four levels of the Rule of Law is detailed in Table 5 (World Bank, 2025).

Table 5: Levels of legal stability according to the Rule of Law indicator.

RULE OF LAW: LEVELS OF LEGAL STABILITY			
UNSTABLE LEGAL SYSTEM	PARTIALLY FUNCTIONING LEGAL SYSTEM	MODERATELY FUNCTIONAL LEGAL SYSTEM	EFFICIENT AND TRUSTWORTHY LEGAL SYSTEM
Court rulings are unpredictable, politically influenced, or arbitrary.	High level of political influence on the judiciary. Slow, inefficient court proceedings with a high risk of unfair judgments.	The judicial system is functional but slow or expensive, making access to fair trials difficult. Courts are largely independent, but there is selective political or economic influence.	The judiciary is independent and apolitical, and fair trials are guaranteed.
Enforcement of contracts and property rights is unreliable or non-existent.	Fidelity to contracts and property rights are restricted or difficult to enforce.	Contracts and property rights are generally respected, but there are uncertainties in enforcement.	Law enforcement is efficient. Contracts and property rights are consistently protected.
Police and judiciary are inefficient, untrustworthy, or involved in illegal activities themselves.	Police and judiciary are partially functional but characterized by inefficiency or lack of independence.	Police and judiciary are generally trustworthy but have shortcomings in certain areas.	Companies and individuals can rely on a stable and predictable legal situation.
Arbitrary expropriation and abuse of state power against companies and individuals are common.	State interventions in the economy (e.g., expropriation, sudden changes to contracts) are unpredictable.	State interference in property and contracts is rare, but not impossible.	The state respects property rights, expropriations are only possible under fair legal conditions.

3.1.1.5 Control of Corruption

The Control of Corruption indicator measures the severity of and efforts to combat abuse of power by public officials for private financial gain or interests. This indicator assesses the presence and effectiveness of mechanisms that fight corruption, bribery, and misuse of authority within the system. Bribery and corruption can occur in all public sectors, such as the judiciary, government, commerce, or taxation, to promote personal interests over public policy. Companies suffer from this abuse of power because it can limit their business opportunities, lead to legal issues, or harm their reputation. Consistent with previous indicators, lower levels of corruption enhance economic growth, and increased transparency and trust foster a more investment-friendly environment, which are key drivers of the bioeconomy (Barra & Falcone, 2024; Kaufmann & Kraay, 2024).

In Table 6, the effectiveness of anti-corruption measures is categorized into four levels based on the current level of corruption: widespread corruption, high corruption with reform efforts, moderate corruption, and low corruption (World Bank, 2025).

Table 6: Levels of effectiveness according to the Control of Corruption indicator.

CONTROL OF CORRUPTION: LEVELS OF EFFECTIVENESS			
WIDESPREAD CORRUPTION	HIGH CORRUPTION WITH SOME REFORM EFFORTS	MODERATE CORRUPTION	LOW CORRUPTION
State institutions are largely riddled with corruption. Elites have considerable influence on politics and the judiciary.	Political influence peddling and high-level corruption are widespread but there are some efforts at reform.	Political influence exists, but transparency and control mechanisms limit this.	Political decision-makers are bound by laws and ethical standards.
Rule of law mechanisms to combat corruption are ineffective or do not exist.	Legal frameworks to combat corruption exist but are often circumvented or insufficiently enforced.	Legal and institutional mechanisms to combat corruption are in place, but there are gaps in enforcement.	Independent institutions ensure transparency and accountability.
Corruption is commonplace and necessary to gain access to public services.	Bribery is necessary in many areas but not universally required.	Bribery in the administration and judiciary is uncommon but does occur in individual cases. Corruption does occur but is not systematic and is sometimes prosecuted.	Cases of corruption are consistently prosecuted and punished.
High economic costs of corruption, including uncertainty for businesses, distortion of competition, and inefficient public spending.	Civil society and media have limited opportunities to expose corruption, with sometimes severe consequences for whistleblowers.	Civil society, media, and economic actors can uncover incidents of corruption, albeit with risks.	The media and civil society can expose abuses without fear of negative consequences.

3.1.1.6 Governance of Bioeconomy Risks

Although sustainability aspects are anchored in the bioeconomy concept, potential conflicting goals during the operational implementation of a transition to CBE require attention. Conflicting trade-offs can have social, environmental, and economic impacts. Examples include high demand for biomass, using arable land for non-food purposes, dedicating agricultural land to animal products, or deforesting primary forests for biomass production. Consequently, transitioning to a bioeconomy can negatively affect natural resilience (air, forests, land, or water), climate, health, nutrition, inequality, and poverty. Recognizing potential risks and implementing effective governance of these conflicting objectives are essential to ensuring a sustainable bioeconomy. An important factor in determining whether the bioeconomy positively or negatively impacts sustainability is the application of innovative, efficiency-enhancing technologies and good governance (Dietz et al., 2018; Gawel et al., 2016; Issa et al., 2019; Jander et al., 2020).

According to the study by Dietz et al. (2018), Table 7 presents four levels of risk management for addressing conflicting regional goals in implementing a bioeconomic strategy, highlighting the extent of political measures taken to manage these risks and trade-offs.

Table 7: Levels of risk management according to the Governance of Bioeconomy Risks indicator.

REGIONAL BIOECONOMY: LEVELS OF RISK MANAGEMENT			
NO RISK ANALYSIS	LIMITED RISK ANALYSIS	SYSTEMATIC RISK ANALYSIS	COMPREHENSIVE RISK MANAGEMENT
No clear strategy for minimizing risks or addressing conflicting objectives.	There is no detailed analysis or clear strategy for minimizing risks.	Risks and conflicting objectives are systematically analyzed.	A detailed analysis and assessment of the risks is available.
Political measures consolidate only established industries (e.g., fossil fuels, intensive agriculture).	Risks and conflicting objectives are acknowledged but only briefly or generally described.	Possible uncertainties are addressed. Initial measures for risk reduction or dealing with incompatible objectives are integrated.	Monitoring and adjustment mechanisms are built-in to deal flexibly with new risks. Concrete measures to minimize risks and resolve conflicting objectives are clearly defined.

3.1.1.7 Strategic Objectives of Regional Bioeconomy

To evaluate the bioeconomy, the literature also examines whether a political strategy is in place and to what extent this strategy is implemented (Biber-Freudenberger et al., 2018; Dietz et al., 2018; Marcone et al., 2022). Therefore, we developed an indicator that assesses the region's strategic objectives and their fulfillment. It emphasizes regional strategies and implementation efforts related to the bioeconomy, since national policies and efforts may not influence the regions under study.

According to Dietz et al. (2018), the transition to bioeconomy can be divided into four transformation paths (TP), with several paths that can be followed during implementation. These pathways cover different approaches and objectives of the bioeconomy and can be addressed simultaneously within the same strategy.

- *TP 1 involves promoting the substitution of fossil fuels and materials with bio-based resources.* This shift is driven by economic and political motivations and has implications for land use due to the biomass extraction needed for these purposes.
- *TP 2 aims to increase productivity in agriculture, forestry, and water.* This pathway is powered by innovations in production methods and increases the demand for arable land, which could impact vulnerable ecosystems.
- *TP 3 focuses on the processing and recycling of biological raw materials and supports more efficient biomass use and waste reduction.* The long-term success of this path largely depends on consumer choices, market mechanisms, and policy regulation.
- *The core principle of TP4 is the biotechnology sector.* Sustainable production methods and innovative products enable the use of biological principles and processes in industry and open new opportunities for value creation within TP 4. This specific pathway can generate high economic value without requiring large amounts of biomass, relying instead on knowledge. As a result, linking existing industries and promoting research and development are essential.

Many industrialized nations pursue all four paths. In contrast, many emerging countries, including some countries of the RIBES regions, do not have a bioeconomy strategy or focus on one of the first two paths (TP1 or TP2)(Dietz et al., 2018). The study by Biber-Freudenberger et al. (2018) indicates that countries with a high-tech-oriented bioeconomy exhibit a greater diversity of bioeconomy strategies. These countries are characterized by higher knowledge intensity and lower requirements for well-trained labor.

While the study by Dietz et al. (2018) examines the number of paths considered in each bioeconomy strategy, we focus on how extensively and effectively a bioeconomy strategy is implemented. Because the concept of bioeconomy is abstract and not yet widespread, we use the TPs of Dietz et al. (2018) to illustrate how well bioeconomy strategies are fulfilled by the RIBES participants in their self-assessment (see [Table 8](#)).

Table 8: Levels of strategy fulfillment according to the Strategic Objectives of Regional Bioeconomy indicator.

REGIONAL BIOECONOMY: LEVELS OF STRATEGY FULFILMENT			
NO LOCAL BIOECONOMIC STRATEGY	EMERGING BIOECONOMIC STRATEGY	DEFINED BIOECONOMIC STRATEGY	COMPREHENSIVE BIOECONOMIC STRATEGY
There are no specific local bioeconomy strategy or guidelines.	A local bioeconomy strategy exists but contains imprecise or unverifiable targets.	The local strategy contains precise and measurable targets for bioeconomy development with recognizable prioritization of transformation paths.	A detailed and long-term bioeconomy strategy is in place in which the transformation paths are optimally combined and coordinated.
Strategic goals are vague and not aligned with specific needs for a bioeconomic transformation.	Strategic goals are vague and not aligned with specific needs for a bioeconomic transformation.	Strategic goals are vague and not aligned with specific needs for a bioeconomic transformation.	The strategy is closely interlinked with other policy areas (e.g., climate, agriculture, industry) and remains flexible enough to react to new developments.
There is a lack of measurable indicators or mechanisms to evaluate the success of the bioeconomy strategy.	There is a lack of measurable indicators or mechanisms to evaluate the success of the bioeconomy strategy.	There are measurable indicators for evaluating success, which are regularly reviewed and published.	Continuous measurement of success and adaptation of the strategy is ensured.
No identifiable actions: TP1: to promote bioenergy TP2: to enhance productivity in agriculture and forestry TP3: to efficiently use biomass and encourage recycling TP4: to foster biotechnological innovations.	Initial efforts in one or more TP are identifiable but lack clear prioritization or long-term planning strategies: TP1: Subsidies for bioenergy are offered without considering global land use impacts. TP2: Measures to increase productivity in agriculture and forestry are considered but lack mechanisms to prevent negative environmental consequences. TP3: Recycling and efficient biomass use are mentioned as objectives but are not yet supported by specific innovation funding. TP4: Biotechnological approaches are mentioned but lack a clear strategy for integration into existing industries. Success is measured sporadically or only for individual sub-areas.	Initial successes in implementation are already visible: TP1: There are targeted measures to promote bioenergy, considering the impact on land use and climate targets. TP2: Productivity increases in agriculture and forestry are actively promoted, including measures to minimize negative ecological effects. TP3: Efficient biomass use and recycling are essential components of the strategy, with specific incentives for resource-conserving innovations. TP4: Biotechnological innovations are systematically promoted through targeted research policies or industry funding.	Implementation is already showing measurable positive effects on the economy, environment, and employment: TP1: Bioenergy is being expanded in a targeted manner, considering sustainability criteria and global interactions. TP2: Productivity increases in agriculture and forestry are achieved through innovative technologies that avoid ecological damage. TP3: Increased efficiency and recycling are an integral part of the strategy, with clear political incentives to promote the circular economy. TP4: Biotechnological innovations are successfully integrated into industrial processes and promote new value chains.

3.1.1.8 External Support for Regional Bioeconomy

The effectiveness and scope of previous external support measures that the respective region has already received for expanding the local bioeconomy should be evaluated as part of the self-assessment. External support can come from the national government, the European Union, or international organizations, including financial aid, technical assistance, or capacity building. The criteria for this indicator are structured implementation with a broad scope and tangible impact. This information provides insight into the need for support or indicates whether existing support is not reaching its target and requires reassessment of current policy systems. Please refer to Table 9 for the levels of external support for regional bioeconomy development.

Table 9: Levels of the External Support for Regional Bioeconomy indicator.

REGIONAL BIOECONOMY: LEVELS OF EXTERNAL SUPPORT			
NO SUPPORT	INITIAL OR ISOLATED SUPPORT	STRUCTURED BUT MODERATE SUPPORT	COMPREHENSIVE AND CONTINUOUS SUPPORT
No targeted support exists to foster the regional bioeconomy.	Support framework exists but there is a lack of structure, the time frame is limited, or the efforts are thematically restricted.	Support implementation is structured but with a potential for improvement in the scope and impact of measures.	Targeted funding, integrated strategies, and active partnerships with national or international stakeholders drive the success of the regional bioeconomy.
No existing regional funding programs, partnerships, or initiatives (e.g., technical assistance or capacity building) to encourage regional bioeconomy measures.	A limited number of supporting efforts (e.g., funding, technical assistance, or capacity building) from the EU, as well as national or international funding bodies, are available.	The region is involved in ongoing programs or initiatives including funding, technical assistance, or capacity building to promote the bioeconomy from the EU, national or international institutions.	Long-term, external support including funding, technical assistance, or capacity building from national and international institutions significantly contributes to the regional transition to the bioeconomy.

3.1.2 Economic Dimension

In addition to governance aspects, the bioeconomy is also reflected in the economic sphere. Analysis on an economic level offers the opportunity to quantify the performance of the bioeconomy and supports political decision-making. Furthermore, the relevance of governance perspectives highlights potential economic and administrative conflicts of objectives in promoting the bioeconomy, particularly in coordinating regulatory frameworks and policy coherence, which can hinder the holistic integration of a sustainable bioeconomy. Therefore, ensuring the compatibility of economic development and governance structures is an important aspect that requires consideration in political decisions and, therefore, demands ongoing oversight and evaluation. However, strengthening the bioeconomy alongside robust governance mechanisms in the respective sectors can also lead to positive socio-economic effects, such as the creation of new jobs in rural and industrial areas and an increase in employment figures (Jander et al., 2020; Marcone et al., 2022; Zavadskas et al., 2007).

In academic literature, the economic indicators Turnover, Gross Value Added, and Employment are mainly used to evaluate the bioeconomy (Barra & Falcone, 2024; D'Adamo et al., 2020; Eurostat, 2025; Ronzon & M'Barek, 2018). This enables the assessment of the bioeconomy's economic efficiency. In some sources, additional indicators are also sometimes used, but were not included in this study due to limited data availability.

3.1.2.1 Turnover

Turnover is widely regarded as one of the key economic indicators for evaluating the performance of bioeconomy sectors. It represents the total revenue generated from bio-based products and services and thus offers insights into market trends, economic significance, and sector development over time. However, due to the absence of reliable and disaggregated turnover data specifically for bioeconomy sectors at the regional level, it cannot be used as an indicator in this analysis (D'Adamo et al., 2020; Eurostat, 2025; Jander et al., 2020; Ronzon & M'Barek, 2018).

As an alternative, this study uses regional net turnover by innovation status as a proxy indicator. This data set includes turnover from innovation-active enterprises, including those with product or process innovations, and is available at the regional level. Since innovation is crucial in facilitating the transition to a circular bioeconomy, this indicator is especially relevant. It provides an indirect way to assess how economically important innovation activities are in a region, which is a key aspect of competitiveness and transformative capacity (Eurostat, 2025; Jander et al., 2020).

According to Jander et al. (2020), innovation indicators in bioeconomy aim to provide insights into where and to what extent innovation activities and outcomes are expected. They also assist in evaluating how innovation contributes to achieving broader societal goals, such as enhancing economic competitiveness and sustainability. While ideally covering the entire innovation process—from input to societal impact—data limitations often restrict focus to more accessible economic aspects. Therefore, turnover by innovation status serves as a practical, though partial, proxy for understanding the economic role of innovation in the regional bioeconomy.

3.1.2.2 Gross Value Added

Gross Value Added (GVA) offers insight into the actual income generated from biobased products for the factors of production, such as labor and capital. This indicator is calculated by subtracting inputs like material costs, energy, and services from the total value of goods and services at current production prices. This data provides an overview of the value created through operational bioeconomic activities. It enables the assessment of the economic significance of bioeconomic sectors relative to other sectors and aids in shaping policy measures (Capasso & Klitkou, 2020; D'Adamo et al., 2020; Eurostat, 2025; Jander et al., 2020; Ronzon & M'Barek, 2018).

3.1.2.3 Employment

A key objective of transitioning to a bioeconomy is to create and secure jobs. Besides its social impact, employment levels in bio-based industries serve as a significant economic indicator for the bioeconomy. The number of people working in these industries reflects the bioeconomy's influence on the macroeconomic goal of full employment and provides an important indicator for policymakers. This indicator measures both direct employment— including unpaid family workers—and indirect employment involved in producing bio-based products. It allows for the assessment of policy measures related to employment and the occupational effects resulting from the adoption of new technologies and innovations. Examining the employment structure within bioeconomy sectors is especially important in RIBES regions, as studies suggest that actors in agricultural sectors tend to be less interested in and generally critical of innovations. Additionally, employment data offer valuable insights into the governance capacity within the bioeconomy. Having a skilled workforce is essential for successfully implementing and expanding bio-based strategies. A well-trained labor force not only facilitates the adoption of innovations but also indicates a region's institutional ability to mobilize and coordinate relevant human resources for bioeconomic transformation (Baur et al., 2016; D'Adamo et al., 2020; Eurostat, 2025; Jander et al., 2020; Ronzon & M'Barek, 2018; Stegmann et al., 2020).

3.1.3 Social Dimension

The move toward a bioeconomy has major impacts on key areas of life, including nutrition, mobility, and consumption within society. Social and societal factors serve not only as supporting elements but also as fundamental drivers of bioeconomic growth. At the same time, this shift is limited by deeply ingrained consumption and behavior patterns that originated in the fossil fuel era and continue to influence society today. Consequently, essential innovation processes within CBE can be delayed. Therefore, it is crucial to systematically incorporate social dimensions into the RIBES regions when designing bioeconomic transformation efforts (Dietz et al., 2018; Issa et al., 2019).

Beyond political measures, consumers play a vital role in guiding the shift toward a bioeconomy. Integrating new bioeconomic ideas and technologies into existing routines and social-institutional settings remains a significant challenge. Because the way technology and social structures interact greatly affects how bioeconomy transformation is accepted, consumer knowledge and behavior are essential for establishing sustainable bioeconomic practices. Therefore, education, age, income, and gender significantly influence the willingness to adopt innovations (Geels, 2002; Pyka, 2017; Woźniak et al., 2021).

In this context, stakeholder acceptance along the CBE value chain can become a critical bottleneck. Especially in rural regions, agricultural stakeholders should be seen not only as biomass suppliers but also as potential drivers of bioeconomic innovations and their implementation at the regional level. Therefore, it is crucial to systematically incorporate social dimensions into the research and design of bioeconomic transformation processes in the RIBES regions (Carraresi et al., 2018; Rossi & Hinrichs, 2011; Schmidt et al., 2012).

The following sections introduce indicators such as Gender, Education and Knowledge, and Income within the context of the bioeconomy.

3.1.3.1 Gender

Bioeconomy and gender are closely connected to broader sustainability goals, making it important to consider how gender dynamics influence the implementation and adoption of bioeconomy concepts (Pyka, 2017; Sanz-Hernández et al., 2022).

Structural inequalities can hinder women's active participation in and benefits from CBE. These disparities stem from unequal access to resources, knowledge, labor, finance, or decision-making processes. Promoting equal gender involvement in bioeconomic sectors can yield measurable positive effects. For instance, in the agricultural sector, a key part of the bioeconomy, securing land rights for women has been linked to increased adoption of sustainable farming practices. However, women still remain underrepresented in major bioeconomy sectors, especially in rural and agricultural areas (Meinzen-Dick et al., 2014; Papadopoulou et al., 2023).

Against this background, frameworks for monitoring social sustainability in the bioeconomy require the systematic integration of aspects of gender equality and social justice. This includes analyzing access to and control over key resources and participation in decision-making processes at different levels. The distribution of income and benefits is also influenced by gender relations and should therefore be considered in the transformation to a bioeconomy. Finally, sustainable bioeconomic development should not only be characterized by the elimination of disadvantages but also by the active involvement of all genders (Diaz-Chavez et al., 2019; Meinzen-Dick et al., 2014).

To measure the impact of gender dynamics on the implementation and success of concepts within the bioeconomy, specific variables derived from EUROSTAT datasets are used. These include regional disparities in employment rates, overall employment rates, unemployment rates for individuals aged 15 to 74, long-term unemployment, and labor market slack. All these variables are analyzed separately by gender to ensure a detailed analysis and understanding of gender-specific differences and challenges within the bioeconomy (Eurostat, 2025).

3.1.3.2 Education and Knowledge

Education and knowledge are crucial drivers of societal progress toward a bioeconomy. They form the unconscious foundation for understanding complex relationships within bioeconomy systems and for encouraging behavioral change. Recognizing the negative environmental effects of current methods can generate a sense of moral duty to act, leading to a shift in societal behavior. In this context, informed awareness positively influences the willingness to adopt and implement bioeconomy strategies (Donner et al., 2022; Stern, 2000; Wensing et al., 2019).

Therefore, knowledge transfer and education are key drivers for the development and implementation of bioeconomic transformation pathways. Access to information and understanding bioeconomic concepts greatly influence how successfully new technologies, practices, and business models are adopted and put into practice. As a result, a knowledge-based bioeconomy needs long-term educational strategies that are deeply embedded in society (Dietz et al., 2018; El-Chichakli et al., 2016; Meinzen-Dick et al., 2014; Pyka, 2017; Woźniak et al., 2021).

According to innovation science, individuals go through several stages of the decision-making process when introducing innovations and new technologies. Starting with the knowledge stage, followed by the conviction stage, and ending with the decision to accept or reject the innovation. Bioeconomy approaches are still often in the initial knowledge stage. Therefore, targeted dissemination of relevant information is crucial, as it can influence unconscious decision-making processes. Early adopters of innovations, who tend to have higher levels of education, usually grasp the relevant knowledge faster than others, which facilitates quicker implementation of bioeconomic innovations (Porter & Donthu, 2006; Rogers, 1962).

Despite its importance, the idea of bioeconomy is often not yet fully understood in society, especially in rural and farming areas. However, studies show that as people become more familiar with the topic, they are more open to training and further education programs. Agricultural stakeholders with higher education levels tend to have greater confidence in the potential of bioeconomy and show more interest in a regional exchange of knowledge. Even those who are initially skeptical about bioeconomic practices are willing to participate in state or regional subsidized training programs. Meanwhile, supporters of the bioeconomy, who also see its benefits for the Earth's ecosystems and society, are generally characterized by an educated, environmentally aware lifestyle, studies suggest. This highlights the potential of incentive-based, participatory learning methods to help promote regional implementation of the bioeconomy (Donner et al., 2022; Papadopoulou et al., 2023).

Compared to the primary sector, the availability of skilled labor limits the growth of high-tech, knowledge-intensive sectors within the bioeconomy. Investing in education and implementing targeted policy measures are essential to overcoming this challenge. Regions with a higher proportion of people with advanced degrees are more likely to support bioeconomic innovation and benefit from knowledge-based economic growth (Biber-Freudenberger et al., 2018; Zilberman et al., 2013).

Furthermore, public awareness and education are essential for building the societal support policymakers need to take action. Informed and environmentally conscious citizens send signals and lend legitimacy to speeding up the transition towards a CBE (Dietz et al., 2018; Issa et al., 2019; Meinzen-Dick et al., 2014).

At a structural level, societal path dependencies often create greater challenges to bioeconomic transformation than technical or institutional obstacles. A lack of understanding about the properties of bio-based products or a limited view of the bioeconomy as a risky technology can reduce consumer confidence and hinder acceptance (Dietz et al., 2018).

To quantify and assess the impact of education and knowledge on the adoption and success of bioeconomic strategies, specific variables derived from EUROSTAT datasets are used. These include the participation rate in education and training, as measured within the last four weeks for individuals aged 25-64. Additionally, the population is categorized by educational attainment levels, including upper secondary, post-secondary non-tertiary, and tertiary education. The analysis also considers those with less than primary, primary, and lower secondary education. By disaggregating these variables, we can gain a nuanced understanding of how education influences the public's receptiveness to bioeconomic initiatives and drives societal progress toward sustainable practices (Eurostat, 2025).

3.1.3.3 Age

Age also influences attitudes toward and acceptance of bioeconomy. The study by Papadopoulou et al. (2023) in rural Greece shows an age-related effect on how the bioeconomy is perceived and adopted within businesses. Accordingly, younger farmers tend to view the benefits and implementation of the bioeconomy more positively through training compared to older farmers. Younger individuals could therefore serve as change agents. Policymakers should create specific funding for young actors in rural areas to help recruit them as multipliers (Pyka, 2017).

To evaluate the influence of age on attitudes toward and the adoption of bioeconomic strategies, specific variables sourced from EUROSTAT datasets are employed. These include economic activity rates for the age groups 15-74, 15-24, and 25-34 years, alongside employment rates for individuals aged 15-24 and 20-64 years. Additionally, the educational attainment levels of the population for the age groups 25-34 and 25-64 years are considered. By examining these variables, a better understanding can be gained of how age-related differences affect perceptions and engagement with the bioeconomy, highlighting the of younger individuals as potential catalysts for change (Eurostat, 2025).

3.1.3.4 Income

Income affects individuals' willingness and ability to participate in and benefit from bioeconomic transformation processes. This is shown in the results of the study by Papadopoulou et al. (2023) in rural Western Macedonia, Greece, where people with well-above-average incomes tend to be somewhat engaged in the bioeconomy. These individuals predominantly view various aspects of the bioeconomy positively. However, they also express doubts or uncertainties in other areas, indicating that higher income alone does not automatically result in full engagement or unquestioning acceptance of bioeconomy approaches. These findings suggest that while economic resources can help improve access to bioeconomy knowledge and technologies, targeted efforts are still needed to address perceived risks or information gaps, especially among those who have resources but remain hesitant (Pyka, 2017).

To understand the impact of income on individuals' willingness and ability to participate in bioeconomic transformation processes, specific variables from EUROSTAT datasets are employed. These include the income of households, represented by the balance of primary incomes or national income (net), as well as the income quintile share ratio S80/S20. By analyzing these variables, insights can be gained into how economic resources influence engagement with and perception of the bioeconomy (Eurostat, 2025).

3.2 Self-Assessment

In collaboration with local partners, a self-assessment survey was conducted to generate data on the existing governance structures in the RIBES participating regions, along with their specific features, challenges, and opportunities. The survey was based on a set of indicators previously developed for the governance dimension (see [Annex A](#)).

The self-assessment template was presented for the first time at the RIBES Third Project Meeting in March 2025. It was then disseminated to the MTF partners of the participating regions on 15 May 2025, along with a request for them to provide a self-reflective assessment of the governance practices in place at that time. In total, ten self-assessments were collected by 21 August 2025. One self-assessment was submitted per region, except for Plovdiv in Bulgaria, which submitted three. A further two self-assessments were submitted by 11 September 2025 from the Carpathian region in Ukraine and Vojvodina in Serbia. The completed self-assessment templates were collected by region and analyzed.

This participatory approach helped to identify good practices and governance gaps, fostering a shared understanding among stakeholders.

3.3 Data Sources

Data sources were selected to establish a robust and context-aware foundation for the assessment, incorporating insights from local partners, desk research, and WP2 outputs. By integrating these components, the methodology ensures a comprehensive evaluation of governance effectiveness, highlighting both strengths and weaknesses, and facilitating the development of innovative, inclusive, and sustainable governance models that can support transformative change in regional CBE ecosystems.

The desk research is based on document analysis and secondary data sources, including policy reports, academic literature, and the findings of Tasks 2.1 and 2.2, summarized in RIBES Deliverables 2.1 and 2.2) (Müller et al., 2025; Wintjes et al., 2025). These deliverables provide a detailed socio-economic and sectoral context. The research focused on reviewing and systematically analyzing the relevant institutional and regulatory frameworks for the circular bioeconomy and social innovation in the participating regions.

Quantitative data from the European Statistical Office (EUROSTAT) datasets were utilized to illustrate the social and economic dimensions in this report (Eurostat, 2025). EUROSTAT operates as a department of the EC, primarily tasked with delivering statistical data to EU institutions and fostering the standardization of statistical methods among its Member States, candidate countries, and EFTA nations. The decision to use Eurostat datasets instead of the EU Bioeconomy Monitoring System¹ or other specialized bioeconomy databases was based on several key considerations. While Eurostat is not specifically designed to provide bioeconomy statistics, it offers a broad and harmonized set of socio-economic and sectoral indicators. A crucial advantage of Eurostat is the availability of regional-level data, which in many cases extends to subnational administrative units. In contrast, the EU

¹ https://knowledge4policy.ec.europa.eu/bioeconomy/monitoring_en

Bioeconomy Monitoring System primarily provides data at the national level, which would not adequately reflect the regional dynamics required for this study. Moreover, Eurostat datasets are updated more frequently and systematically than most alternative bioeconomy-specific databases, ensuring a higher level of timeliness and data availability (Eurostat, 2025).

To focus solely on bioeconomically relevant data for the economic indicators, only statistics from the bioeconomy sectors were used for this study. The selection of bioeconomy sectors is based on the work of Ronzon & M'Barek (2018). These sectors are listed in Table 10. These 18 micro sectors are official statistical classifications from Eurostat, the statistical office of the European Union (EU). Eurostat is responsible for processing official European data and providing it in a database. In addition to national and regional economic data from the 28 EU member states, the Eurostat database also contains statistics on businesses, population, trade, and production, which are available annually and, in some cases, more frequently. The bioeconomy sectors in Table 10 include the corresponding NACE code, which classifies economic sectors within the Eurostat database. Since not every selected sector is entirely a bioeconomy sector, the respective sector is referred to as a hybrid sector that uses biomass or fossil carbon as a feedstock (C13, C14, C31, C20, C21, C22, C2014, C2059, and D3511). This reflects the key data challenge of the bioeconomy, as there are datasets, such as the EU Bioeconomy Monitoring System, that distinguish between bio-based and non-bio-based sectors and products; these are mostly available only at the national level. This limited geographical resolution makes them less suitable for analyzing regional bioeconomy dynamics, which is a core focus of the RIBES project. In addition, many of the existing statistics do not fully capture the bio-based share within hybrid sectors, and their coverage is still strongly focused on biomass use. Innovative sectors and products with a high biotechnology component are not yet systematically measured, which further limits the accuracy of bioeconomy assessments. More advanced approaches are currently being explored internationally. For instance, the NASEM proposal to develop bioeconomy satellite accounts in the United States of America, which aims to provide a more comprehensive measurement framework for emerging bio-based industries (D'Adamo et al., 2020; Jander et al., 2020; National Academies of Sciences, Engineering, and Medicine et al., 2020).

Among the sectors listed in [Table 10](#), agriculture (A01) notably has a huge impact on a country's overall success in the bioeconomy, followed by the production of food, beverages, and tobacco (C10, C11, C12) (D'Adamo et al., 2020). Improvements in agriculture play a key role in the bioeconomy. Here, the focus is on promoting traditional agriculture rather than urban farming. This emphasis is especially strong in low-income countries, which also stress traditional food production, compared to high-income countries that focus on reducing food waste. Differences between industrialized and developing nations are also clear in their energy priorities. While industrialized countries aim their bioeconomic efforts at optimizing energy use and developing alternative energy sources, lower-income countries focus on energy production and building suitable energy infrastructure (Issa et al., 2019).

Table 10: Bioeconomy Sectors (based on Eurostat, 2025 and Ronzon & M'Barek, 2018)

NACE CODE	BIOECONOMY SECTOR
A01	Agriculture
A02	Forestry
A03	Fishing and aquaculture
MANUFACTURE OF FOOD, BEVERAGES AND TOBACCO	
C10	Manufacture of food
C11	Manufacture of beverages
C12	Manufacture of tobacco
MANUFACTURE OF BIO-BASED TEXTILES	
C13*	Manufacture of textiles
C14*	Manufacture of wearing apparel
C15	Manufacture of leather
MANUFACTURE OF WOOD PRODUCTS AND FURNITURE	
C16	Manufacture of wood products
C31*	Manufacture of furniture
C17	Manufacture of paper
MANUFACTURE OF BIO-BASED CHEMICALS, PHARMACEUTICALS, PLASTICS, AND RUBBER (EXCLUDING BIOFUELS)	
C20*	Manufacture of chemicals (excluding biofuels)
C21*	Manufacture of pharmaceuticals
C22*	Manufacture of bio-based plastics and rubber
MANUFACTURE OF LIQUID BIOFUELS	
C2014*	Manufacture of bioethanol
C2059*	Manufacture of biodiesel
D3511*	Production of bioelectricity
*Hybrid sector	

3.4 Data Analysis

The data analysis focused on evaluating existing governance practices, as well as assessing economic and social indicators relevant to regional bioeconomy performance. The evaluation applied a combination of qualitative and quantitative methods, including the analysis of qualitative secondary data, the assessment of quantitative EUROSTAT data, and the incorporation of qualitative content derived from regional self-assessments. This methodological triangulation enabled an in-depth understanding of governance structures within their respective regional contexts.

The feedback from the self-assessments was considered holistically and incorporated into an analysis of the current state of governance practices. The qualitative analysis of the current state explicitly addresses the perceptions of the local stakeholders surveyed in the RIBES regions on governance aspects. The individual topics are derived from the indicators used to describe governance performance in the RIBES regions.

In order to quantify perceptions of the current situation regarding governance performance in the RIBES regions, the indicators based on the performance categories were mapped using a grading scale. The participants were invited to indicate their level of agreement or disagreement with each statement using a rating scale ranging from 1 (strongly disagree) to 5 (strongly agree), with 0 indicating no answer. The assessment on the topics is presented in the form of a spider diagram for the individual RIBES regions. The ratings displayed for the subjects are derived from the mean values of the respective indicators. The quantitative evaluation of the survey is based on a small sample ($n=12$). Consequently, the findings are not statistically representative. Instead, they function as a means of highlighting trends and providing preliminary insights into the perceptions, assessments, and perspectives of the respondents.

The results of the self-assessments on existing governance practices were then clustered according to strengths, weaknesses, risks, and opportunities using SWOT analysis. The analysis yielded insights into existing gaps and potentials, thus providing a foundation for the identification of fields of action that would contribute to the enhancement of governance structures in the RIBES regions in the future.

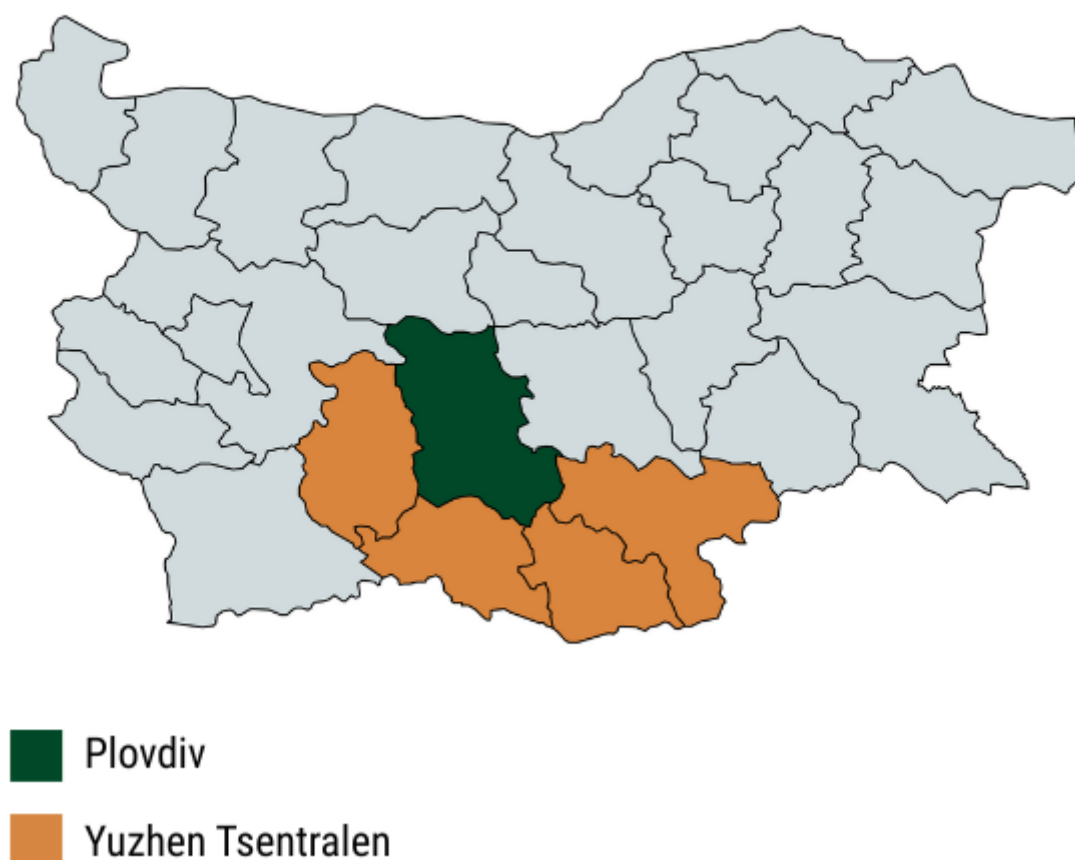
4. Assessment of Existing Governance Practices

This section offers a comparative analysis of governance practices in the RIBES regions, emphasizing their importance in enabling the transition to a sustainable and circular bioeconomy. The evaluation mainly relies on the results of the regional self-assessment conducted within the RIBES project, which examines institutional arrangements, policy frameworks, stakeholder engagement mechanisms, and coordination capacities at the regional level.

Quantitative socio-economic data complement the governance analysis to provide context for the institutional findings, as well as insights from the work conducted under WP2 of RIBES, which explored sectoral and cross-sectoral opportunities for bioeconomy development. Together, these sources offer a multidimensional view of the governance readiness, strengths, weaknesses, and opportunities of each region, thereby guiding targeted policy recommendations and capacity-building measures to accelerate the bioeconomy transition in line with the goals of the European Green Deal.

4.1 Plovdiv, Bulgaria

Figure 1: Map of provinces in Bulgaria.



Created with MapChart

As outlined in RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), Plovdiv's transition toward a circular bioeconomy is grounded in its strong agricultural heritage, particularly in food production and winemaking. Yet, it faces a distinct set of regional challenges and untapped opportunities. While the Agricultural University of Plovdiv is a key advocate for circular bioeconomy principles, overall awareness remains low, especially within rural communities, and social entrepreneurship is still in its early stages. Initiatives aimed at integrating marginalized groups into agribusiness and tourism reflect the region's social innovation potential, but these efforts often lack coordination and adequate educational support. Promising bio-based value chains are emerging in agri-food production, winemaking, organic waste recycling, and bioenergy, offering viable paths for sustainable regional development. However, limited investment capacity, low familiarity with bio-based technologies, and poor access to financing continue to constrain progress.

4.1.1 Socio-Economic Profile

The province of Plovdiv (highlighted in dark green in [Fig.1](#)) is located in the central southern part of Bulgaria ([Fig. 1](#)). In 2024, 633,586 people lived in an area of 5,972.9 km². This province is part of the economically strong Yuzhen Tsentralen planning region (highlighted in yellow in [Fig.1](#)) in the south of the country that includes five provinces and is characterized by robust economic development at the

provincial level. With a gross domestic product (GDP) of € 7,182.95 million at current market prices¹, Plovdiv is ranked second highest among all regions in 2023. In terms of GDP per capita, with € 11,400 per inhabitant², Plovdiv is among the top quarter of all Bulgarian regions and is slightly below the national average³. In addition to the chemical industry, the primary sector, particularly in the production of fruits, vegetables, and cereals, plays a significant role and is characterized by high levels of irrigation in Plovdiv (Dokov, 2024; Eurostat, 2025; MAFF, 2021).

Due to limited data availability at the NUTS-3 level (Plovdiv), most of the data presented here refers to the wider NUTS-2 region Yuzhen Tsentralen, which includes Plovdiv. As in other European regions, bioeconomy-specific data are not fully available across all indicators. Therefore, unless explicitly noted, the data refer to the general economy and should be interpreted accordingly (Eurostat, 2025a).

The economic performance of the Yuzhen Tsentralen region, and Plovdiv in particular, positions the area favorably in the national context. In 2022, the net turnover from innovative enterprises in Yuzhen Tsentralen amounted to €11.46 billion, ranking second among Bulgarian regions. This indicates a solid innovation potential in the region, which could provide fertile ground for bioeconomy-related growth, particularly if supported by targeted institutional frameworks. The innovation potential of Yuzhen Tsentralen has been recognized by the Regional Innovation Valleys Initiative, which selected it and 146 other European regions for its commitment to enhancing coordination and directionality of their research and innovation (R&I) investment and policies (Eurostat, 2025).

The GVA in the bioeconomy-relevant sectors underlines the structural importance of the region in Bulgaria's transition to a more circular economy. In Plovdiv, the GVA in NACE sector A (agriculture, forestry, and fishing) amounted to € 1,915.7 million in 2023, while the GVA in NACE C (manufacturing) stood at € 152.87 million. It is important to note that NACE A is fully attributable to the bioeconomy, whereas NACE C includes both bio-based and non-bio-based activities, and can therefore only partially reflect bioeconomic value creation. Data for NACE D (energy) is not available at the NUTS-3 level, and further disaggregation is currently not possible, limiting precise interpretation. From an employment perspective, Yuzhen Tsentralen demonstrates considerable labor engagement in bioeconomy-relevant sectors. Employment patterns confirm the agricultural prominence of the region. Employment in NACE A in Yuzhen Tsentralen stood at 37.5 thousand people in 2024 (the highest figure among Bulgarian regions), pointing to a significant labor base in a sector fully aligned with the bioeconomy. Likewise, employment in NACE B–E (industry excluding construction) was also the highest nationwide, reaching 149.1 thousand in 2024. This reflects a strong industrial capacity, although only NACE C and D can be considered partially bioeconomy relevant. Regional GVA data for NACE D is not available. The actual share of bioeconomy-specific employment within these categories remains unclear due to the lack of further disaggregation (Eurostat, 2025).

Despite strong sectoral foundations, broader labor market trends show a mixed picture. The overall employment rate in Yuzhen Tsentralen was 58.3% in 2024, below the Bulgarian average of 60.4% and the EU-27 benchmark of 61.7%. While the region's unemployment rate was relatively low at 2.9%,

¹ Not adjusted for inflation.

² Ranked seventh out of 28 provinces in Bulgaria.

³ The GDP per capita in Bulgaria was € 14,700 in 2023.

outperforming both the national rate of 4.2% and the EU level of 5.9%, this figure masks underlying structural issues. The long-term unemployment rate was 1.2%, lower than the national (2.2%) and EU-27 (1.9%) averages, indicating resilience in the labor market. Labor market slack, which includes underemployment and unmet employment potential, was 5.5%, below both the national (6.4%) and EU (11.7%) levels, suggesting efficient use of the available workforce. However, challenges persist among younger age groups (Eurostat, 2025).

The NEET (neither in employment, education, nor training) rate for youth aged 15–24 was 12.1% in 2024, higher than both the national average of 10.5% and the EU-27 level of 9.2%. This suggests that a significant portion of youth in the region are disconnected from formal education and employment pathways, which could hinder intergenerational renewal of governance and innovation systems. Early school leaving in Yuzhen Tsentralen was 9%, slightly above the national average of 8.2% and comparable to the EU-27 at 9.4%. While not alarming on its own, this level of early school leaving may limit the region's long-term ability to develop a skilled, innovation-ready workforce. As young people are key drivers of bioeconomic transformation, these indicators reveal an underused potential (Eurostat, 2025).

Although Bulgaria's national gender employment gap remains below the EU average, regional disparities are significant. In 2023, the variation in gender employment gaps across NUTS-2 regions was 49.1% of the national average, showing uneven access to employment for women across the country. While this is below the EU-27 average of 59.5%, it still indicates regional inequalities in gender-related labor market participation. However, Yuzhen Tsentralen has a relatively balanced picture regarding unemployment rates between men and women. In 2024, the unemployment rate for men aged 15–74 was 3.0%, and for women it was slightly lower at 2.9%. Similarly, labor market slack was nearly equal: 5.6% for men and 5.4% for women, both well below national and EU averages, suggesting a fairly inclusive labor market. Nevertheless, a clear gender gap remains in employment (Eurostat, 2025).

In 2024, 64.5% of men in Yuzhen Tsentralen were employed compared to only 52.3% of women. Although unemployment levels are similar, women's participation in the labor market is significantly lower, likely due to broader structural or cultural barriers. A similar gender-based pattern appears among young NEETs. In 2024, 13.7% of young women aged 15–24 in Yuzhen Tsentralen were NEET, compared to 10.5% of young men, indicating additional challenges for young women in accessing education and the labor market, possibly leading to longer-term economic and social disadvantages. Educational attainment remains a key factor for labor market outcomes (Eurostat, 2025).

In 2024, unemployment among those with less than primary, primary, or lower secondary education was 7.2% in Yuzhen Tsentralen, below the national average of 14.5% and the EU-27 average of 11.8%. Those with upper secondary or post-secondary non-tertiary education experienced even lower unemployment at 2.7%, and tertiary graduates had a rate of just 1.8%, close to the national figure of 1.6% and well below the EU average of 3.8%. Despite strong labor market results, adult participation in education and training remains very low. In 2024, only 1.5% of adults aged 25–64 engaged in education or training in the past four weeks, far below the EU average of 13.5%. This was consistent across genders, highlighting a structural challenge in lifelong learning and upskilling (Eurostat, 2025).

Income levels in Yuzhen Tsentralen are substantially below both national and EU levels. In 2022, net primary income per capita was €5,100, compared to €6,900 nationally and €22,700 across the EU-27. This underscores persistent economic disparities. Although income inequality appears slightly less

severe than the national average, indicated by the S80/S20 income share ratio of 5.9 in Yuzhen Tsentralen versus 7.0 across Bulgaria, it still signals significant inequality (Eurostat, 2025).

Overall, Yuzhen Tsentralen and Plovdiv exhibit a strong economic foundation and low unemployment, particularly in agriculture and industry. However, the low employment rate, along with youth disengagement and educational vulnerabilities, indicates that targeted investments in skills development, lifelong learning, and inclusive governance will be crucial for unlocking the region's bioeconomic potential (Eurostat, 2025).

4.1.2 Self-assessment of Existing Governance Practices

The self-assessment of governance practices in the Plovdiv region reveals a mixed picture of regional governance, with positive evaluations in some areas but also significant weaknesses in others.

Regarding *Voice and Accountability*, citizens in the region are seen as actively engaged in political decision-making. Respondents agreed that people participate in co-design processes and regularly attend political dialogue platforms, such as workshops and forums with regulated feedback mechanisms. However, the overall perception of freedom of expression and transparency was more reserved. While the media landscape is formally independent, and citizens are allowed to express their opinions publicly, these aspects were rated as neutral, indicating uncertainty about their actual effectiveness or reach.

Similarly, transparency regarding public access to political decision-making information and equal participation rights for all groups were also rated as neutral, highlighting potential shortcomings in inclusive governance practices and communication. Perceptions of the *Regulatory Quality* show a mixed outcome. While market entry was largely seen as free from political or administrative barriers, and the regulatory environment was perceived as stable and predictable, other aspects were assessed more cautiously. The ease of starting and running a company received a neutral rating, implying that bureaucratic hurdles may still exist. Additionally, respondents were neutral on whether citizens and businesses benefit from this stability in terms of long-term planning. Government interventions in pricing and subsidies were also assessed neutrally. Perceptions of the financial sector regulation were divided. While respondents agreed there is no perceived risk of manipulation or regulatory failure, they were neutral on whether government oversight is adequately protecting consumers and investors.

Public services in the Plovdiv region continue to receive positive evaluations regarding the aspect of *Government Effectiveness*. Respondents agree that basic services such as education, healthcare, and public transport are reliable and aligned with population needs. However, the professionalism and independence of public administration were rated as neutral, possibly pointing to a lack of visible institutional autonomy or transparency. Similarly, responses to policy formulation and implementation were neutral across all areas. While there is no indication of mismanagement, the lack of strong agreement suggests a need for more visible long-term strategy alignment, responsiveness to new challenges, and efficient policy execution. In terms of budget and financial management, citizens felt neutral about how public funds are managed and allocated. However, investment planning in key sectors like healthcare, education, and innovation was rated positively.

The dimension of the *Rule of Law* was rated more critically than others. Respondents disagreed with the statement that the judicial system is fair and independent, and expressed low trust in law enforcement agencies. The predictability and stability of the legal system were also assessed

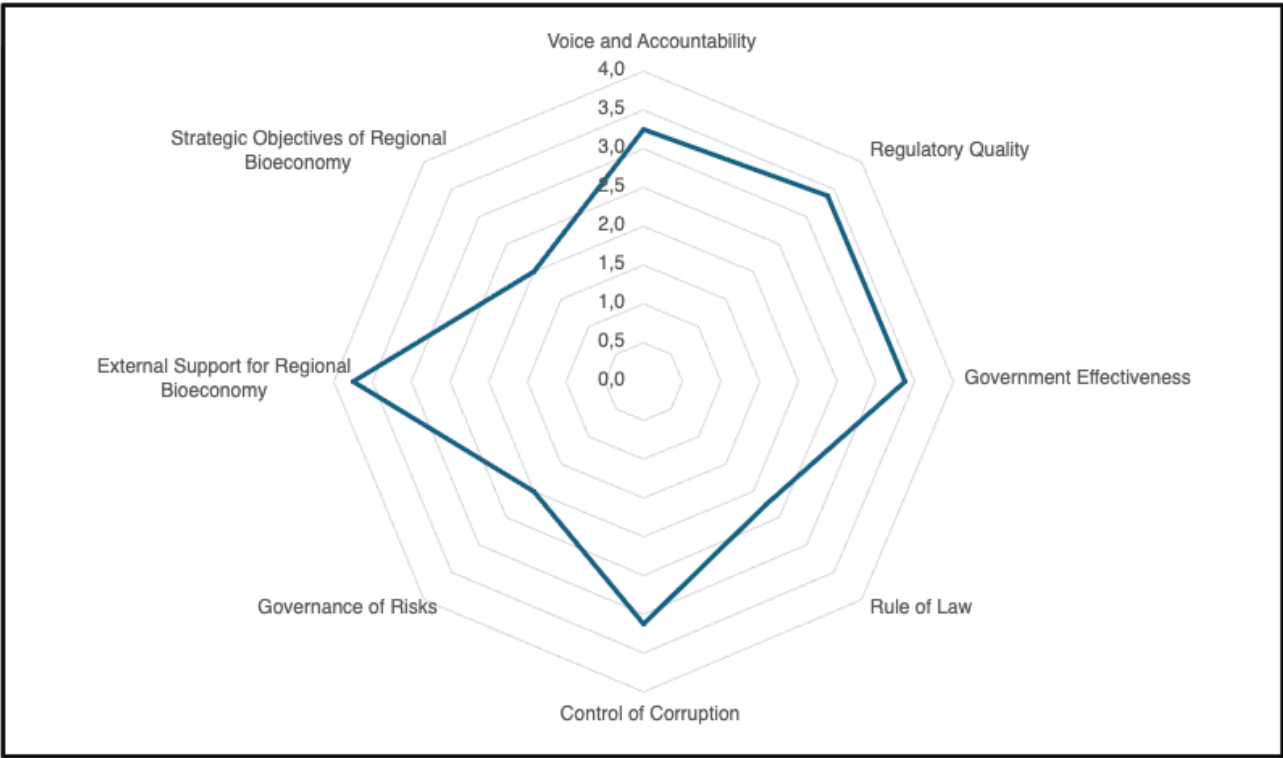
negatively. Ratings for contract enforcement and protection from unlawful state interventions were neutral, suggesting ambivalence or lack of confidence in legal protections. The indicator *Control of Corruption* was acknowledged as a significant issue. Respondents agreed that it impairs access to public services and leads to unfair competition. While legal and institutional anti-corruption frameworks were rated neutrally, this suggests a formal presence without corresponding perceived impact. The same applies to the independence and accountability of public officials, where neutrality implies that ethical standards exist but may not be fully enforced. The role of media and civil society in addressing corruption was also perceived as limited. The protection of whistleblowers was explicitly rated negatively.

A significant governance gap also remains in the management of *bioeconomy-related risks*. Respondents disagreed with all statements regarding risk identification, policy responses, and adaptive mechanisms. There is no strong perception of a political strategy that acknowledges trade-offs, nor of concrete measures to mitigate risks or adapt policies accordingly.

By contrast, *External Support for Regional Bioeconomy* was evaluated more positively. Respondents agreed that EU and national support measures, such as funding and capacity building, are available and accessible and generally aligned with regional needs. These mechanisms are seen as a vital lever for promoting bioeconomic development. However, the sustainability of this support, especially regarding long-term partnerships and capacity-building strategies, remains unclear, with ratings leaning toward neutrality.

One of the most notable gaps highlighted in the self-assessment concerns the *Strategic Objectives of the Regional Bioeconomy*. The respondents largely disagreed with the existence of a clearly formulated bioeconomy strategy tailored to regional needs, and found no evidence of defined goals, indicators, or mechanisms for evaluation and adaptation. While perceptions of implementation were neutral, there was no clear recognition of visible measures, political or financial efforts, or stakeholder involvement that would signal an active strategy. Moreover, there was a strong sense that the strategy is neither integrated with related policy fields nor sufficiently adaptable to new developments. Respondents also strongly disagreed that any tangible outcomes had emerged or that innovative pilot projects were being carried out in the region. The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Strategic Objectives of Regional Bioeconomy*, *Rules of Law*, and *Governance of Risks* ([Fig. 2](#)).

Figure 2: Assessment of existing governance practices in Plovdiv, Bulgaria.



4.1.3 SWOT Analysis of Existing Governance Practices

Based on the self-assessment and socio-economic analysis of the Plovdiv region, several implications emerge regarding the governance framework for a successful transformation toward a circular bioeconomy.

Strengths

A notable strength lies in the active political participation and citizen engagement mechanisms in Plovdiv. Co-design processes and political dialogue platforms are in place and reportedly well-attended, providing a solid foundation for participatory governance. Similarly, basic public services such as healthcare, education, and public transport are perceived as functioning reliably, which indicates a reasonable level of government effectiveness and administrative coordination. In terms of economic structure, Plovdiv benefits from a robust agricultural base, high levels of irrigation, and a strong industrial sector. The presence of the Agricultural University of Plovdiv as a bioeconomy advocate provides a valuable institutional anchor for future innovation and knowledge transfer. The region also ranks second nationally in turnover from innovative enterprises, indicating substantial innovation potential that could be harnessed for bio-based industries. Moreover, external support, particularly from EU and national bioeconomy-related programs, is accessible and seen as relevant to regional needs. These mechanisms present a solid leverage point for capacity building and bioeconomic pilot initiatives, provided they are strategically integrated.

Weaknesses

Despite the encouraging levels of civic engagement, transparency, and freedom of expression, they are not perceived as fully effective. Neutral ratings in these areas suggest uncertainty about whether citizens genuinely influence decisions or merely participate in formalistic consultations. Likewise, equal access to information and participation across social groups remains questionable, potentially limiting inclusiveness, especially for marginalized rural communities. The lack of a clearly defined bioeconomy strategy is a major institutional gap. Respondents reported no evidence of strategic objectives, monitoring indicators, or coordinated implementation mechanisms. This absence undermines long-term vision, policy alignment, and adaptability. Similarly, risk governance in the bioeconomy is virtually nonexistent—there are no structured responses to socio-environmental trade-offs or mechanisms for policy adaptation, which severely limits resilience. Furthermore, coordination among stakeholders appears weak.

Opportunities

Given its economic foundation and institutional resources, Plovdiv has significant potential to become a regional hub for circular bioeconomy innovation. The high GVA in agriculture (NACE A) and strong employment in bioeconomy-related sectors (agriculture and industry) could provide a structural edge for expanding bio-based solutions. These sectors could serve as key points for pilot projects, business incubators, and demonstration farms focused on organic waste reuse, renewable energy, and sustainable food production. The region's innovation potential, demonstrated by high revenue from innovative firms, could be further utilized by strengthening connections between academia, SMEs, and public policy. Custom vocational training and business development initiatives could enable local actors, especially youth and rural entrepreneurs, to participate in bio-based ventures. There is also significant untapped potential in social innovation, particularly through initiatives that aim to include

marginalized groups in agri-tourism or community-supported agriculture. These efforts could boost social equity and system flexibility, provided they receive coordinated support and are part of an inclusive governance strategy.

Threats

The region may face challenges from a silo mentality, where education, agriculture, tourism, and entrepreneurship operate separately rather than through integrated efforts. This fragmentation could slow down the spread of innovation and hinder the development of resilient bio-based value chains. Another persistent threat concerns the *Rule of Law* and *Control of Corruption*. Respondents expressed low trust in the judiciary and law enforcement, and protection for whistleblowers was rated negatively. These governance failures undermine institutional credibility, deter private investment, and limit fair competition as key factors for innovation ecosystems and bioeconomic development.

Potential areas of action for improving governance performance in Plovdiv

In summary, while Plovdiv has specific governance strengths and economic benefits, shifting toward a circular bioeconomy will require addressing key governance challenges, such as establishing a clear strategic direction, strengthening the rule of law, increasing transparency, and improving coordination. By leveraging existing opportunities through collaborative governance, targeted investments, and integrated planning, the region can build a strong position within Bulgaria's bioeconomic landscape. Furthermore, region-specific governance practices should focus on empowering SMEs through targeted funding and support for bio-based business models, enhancing vocational training and business development services, and fostering collaboration among universities, local enterprises, and policymakers. In addition, existing instruments such as the Regional Innovation Strategy and the National Bioeconomy Integration Plan should be leveraged to build a more inclusive, connected, and resilient bioeconomy ecosystem in Plovdiv.

4.2 North Aegean, Greece

Figure 3: Map of administrative regions in Greece.



As reported within the results of RIBES WP2 (Müller et al., 2025; Wintjes et al., 2025), regional bioeconomy development mainly focuses on the primary sector, small-scale agriculture, food processing, waste valorization, eco-tourism, and agroecology. Bio-based products in the region include wine production, olive oil, and essential oils, which are linked to a value chain of biochar production from oil waste. Although the North Aegean is only partially dependent on tourism compared to other Greek islands, sustainable tourism and agroecology have grown in importance in recent years.

The results of RIBES WP2 analysis (Müller et al., 2025; Wintjes et al., 2025) further show that the North Aegean region faces several barriers in its transformation towards CBE. A lack of coordinated regional governance for innovation, the dominance of small-scale production systems, and high logistics costs due to the island geography limit the development of the bioeconomy. At the same time, the region holds potential through existing and emerging linkages. Strengthening cooperation between academia, industry, and cooperatives can foster bioeconomic development. Integrating food production with sustainable tourism experiences offers opportunities for value creation and diversification.

4.2.1 Socio-Economic Profile

The North Aegean archipelago (highlighted in dark green in [Fig. 3](#)), comprising ten islands, is one of 13 regions in western Greece near the Turkish mainland. With a total population of 201,007¹ and 52.1² persons per km², this area is one of the least populated in Greece. Given a GDP per inhabitant of €13,100, the North Aegean has the lowest value compared to the other regions of the country, which is far below the national average of €21,300. The economic prosperity of the area is therefore also far below the European average³. With 1.3% of the national GDP in 2023, North Aegean represents the smallest regional economy in Greece. Moreover, this region is also affected by environmental hazards, including land degradation, water scarcity, and climate change impacts (Eurostat, 2025; Stroggiopoulos et al., 2023).

The North Aegean region exhibits a relatively modest economic performance compared to other Greek regions. In 2022, the net turnover for innovative enterprises was €496.6 million, making it the second lowest among Greek regions. GVA data for 2023 show €95.26 million in the NACE A sector and €97.23 million in NACE C. While NACE A is entirely part of the bioeconomy, NACE C and D are only partially included. Regional GVA data for NACE D are unavailable, so manufacturing figures should be interpreted cautiously due to the lack of sector-specific disaggregation. Employment patterns reveal structural weaknesses in both agricultural and industrial labor markets. In 2024, employment in NACE A reached 15.3 thousand, the third lowest among Greek regions, while jobs in industry excluding construction (NACE B–E) stood at 4.2 thousand, the second lowest nationally. The overall employment rate for those aged 15–74 was 55.5%, slightly above the national average of 54.9% but below the EU-27 average of 61.7%. The unemployment rate was 7.1%, the lowest in Greece compared to other regions, and below Greece's average of 10.1%, though still above the EU rate of 5.9%. A notable point is the sharp decline in the unemployment rate from 16.5% in 2020 to 9.4% in the North Aegean. Long-term unemployment accounted for 2.9% of the labor force, lower than the national level but above the EU average. Labor market slack was 10.6%, and the share of NEET young people (15–24 years) was 17.6%, significantly higher than both the national (9.6%) and EU-27 (9.2%) averages (Eurostat, 2025).

Gender disparities in the labor market are prominent. In 2024, men's employment rates (15–74) reached 64.1%, slightly above the Greek average but below the EU-27 benchmark, while women's employment was substantially lower at 46.5%, lagging behind both national and EU figures. The unemployment rate for men was 5.8%, compared to 8.9% for women, and labor market slack was higher among women (14%) than men (8.1%). The gender employment gap in the 20–64 age group stood at 29.2% in 2023, lower than the EU average but still indicating persistent inequalities. Gender differences are also evident in youth NEET rates, with 15.5% of young men and 19.8% of young women in this category (Eurostat, 2025).

¹ In 2024.

² In 2023.

³ The average GDP of the 27 EU countries in 2023 was €38,100 per inhabitant.

Educational indicators present a mixed picture of the North Aegean region. Participation in education and training (25–64 years) was 6% in 2024, well above the Greek average but still far below the EU-27 rate of 13.5%. The proportion of the population with less than upper secondary education is relatively high, with 26.2% among those aged 25–64, well above the national rate. Among 20–24-year-olds, 78.2% had attained upper secondary education, slightly below the national figure but well above the EU average. Upper secondary and tertiary attainment combined was 86.3% for the 25–34 age group, close to EU levels but below the Greek average, indicating a moderate skills base for the workforce (Eurostat, 2025).

Age-related patterns in economic activity and employment reflect the region's demographic and labor market structure. The overall economic activity rate (15–74 years) was 59.8%, slightly below the national rate. Activity among youth (15–24 years) was relatively high at 26.5%, but their employment rate was only 19.4%, far below the EU average. For prime working-age adults (25–34 years), activity rates reached 83.8%, aligning with national figures, while the employment rate for those aged 20–64 was 70.7%, slightly above the Greek average but still below the EU benchmark. Household income levels in the North Aegean are among the lowest in the EU. In 2022, net primary income per person was €10,300, considerably below the Greek average of €12,900 and less than half the EU-27 average of €22,700. Income inequality, measured by the S80/S20 ratio, was 5.2, nearly identical to the national figure, indicating a relatively even distribution within an overall low-income context (Eurostat, 2025).

4.2.2 Self-assessment of Existing Governance Practices

The evaluation of the governance framework in the North Aegean region shows a mixed and often critical picture based on the self-assessment results. Although participants from the North Aegean acknowledged the importance of information about citizen participation in decision-making, they rated citizen engagement in regional political decisions and information dissemination as unsatisfactory. This comes despite a generally neutral stance on participation rights and a positive view of media freedom and citizens' freedom of expression. This discrepancy indicates that, although freedom of expression is valued, actual citizen participation remains low, possibly due to structural barriers or a lack of communication about participation opportunities.

Perceptions of regional *Regulatory Quality* in the North Aegean are similarly varied. Participants noted that establishing or licensing a business is relatively straightforward under current regional regulations, and government market interventions are seen as neutral. However, concerns about unequal market access, weaknesses in financial regulations, and the unpredictability of the regulatory environment arise. Short-term political and regulatory changes are especially assessed critically and viewed as problematic. There is a rare consensus on the importance of effective investments in key sectors.

Conversely, the *Rule of Law* is seen as a major weakness. While participants remain neutral on trust in law enforcement and contract enforcement, they strongly criticize the lack of judicial independence and legal stability. Additionally, there is little confidence that citizens and businesses are protected from unlawful expropriation or arbitrary state actions. Perceptions of *Corruption Control* vary from neutral to negative, with freedom of the press being the only aspect rated positively.

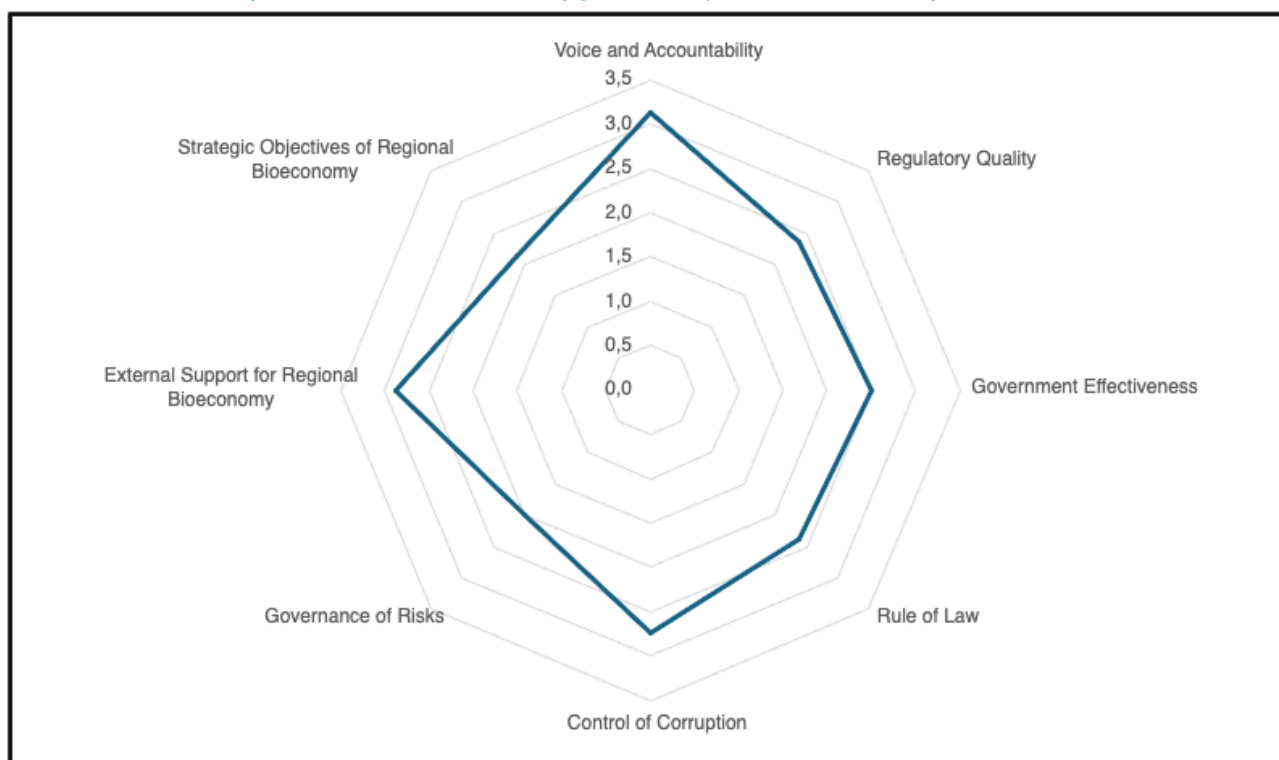
These overall critical perceptions also extend to *Risk Management* concerning the region's bioeconomic transformation.

Regarding *External Support* measures from the EU, national, or international institutions, participants agree that such support is known among citizens, yet they express neutral views on its accessibility, strategic direction, public benefit, and long-term effects. The general assessment is negative when it comes to tangible results and the sustainability of these measures. This indicates that, while there is awareness of external support, its practical implementation and visible advantages are limited. Consequently, a targeted and inclusive funding strategy seems to be missing.

Concerning the indicator on the *Strategic Objectives of Regional Bioeconomy*, the absence of a dedicated bioeconomy strategy at both regional and national levels was noted in North Aegean. Nevertheless, local initiatives are actively seeking funding opportunities for CBE development, regional bioeconomy sectors receive support from local universities, and some collaborations exist at the regional level.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Strategic Objectives of Regional Bioeconomy*, *Rules of Law*, *Regulatory Quality*, *Government Effectiveness*, and *Governance of Risks* (Fig. 4).

Figure 4: Assessment of existing governance practices in North Aegean, Greece.



4.2.3 SWOT Analysis of Existing Governance Practices

The insights gained from the North Aegean region's self-assessment and socio-economic analysis reveal key considerations for the governance structures essential to fostering a circular bioeconomy transition.

Strengths

The North Aegean region benefits from a strong agricultural base and well-established bio-based value chains, including the production of wine, olive oil, and essential oils linked to biochar generation. This provides a concrete foundation for advancing circular bioeconomy models rooted in local resources. Regional universities and cooperatives further contribute to this strength by supporting research, innovation, and knowledge transfer within bioeconomy sectors. The presence of such institutional and cooperative frameworks facilitates collaboration and enhances innovation capacity. Moreover, the region demonstrates a positive environment for governance through strong freedom of expression and media independence, creating potential for transparent and participatory policy-making. Finally, the region's improving labor market situation, characterized by one of the lowest unemployment rates in Greece, indicates growing workforce resilience and potential for greater engagement in emerging bio-based industries.

Weaknesses

Despite these advantages, the North Aegean faces several governance and structural weaknesses that constrain its bioeconomic transition. The absence of a coordinated regional strategy for innovation and the circular bioeconomy limits long-term planning and policy coherence. Citizen participation in decision-making remains low, weakening accountability and inclusiveness in governance processes. Furthermore, perceptions of weak judicial independence and limited rule of law undermine institutional trust and discourage investment. The business environment is further affected by restricted market access and regulatory unpredictability, which hamper innovation and private sector engagement. Persistent socio-economic challenges, including low-income levels and significant gender disparities in employment, reduce both social inclusiveness and investment capacity. Lastly, while external funding mechanisms exist, their long-term impact has been limited due to weak strategic direction and insufficient absorption capacity at the regional level.

Opportunities

There are significant opportunities for enhancing governance and bioeconomic performance in the North Aegean through targeted external and regional initiatives. EU and national funding mechanisms provide a key lever for strengthening institutional capacity, infrastructure, and governance frameworks that support the circular bioeconomy. Collaboration among academia, industry, and cooperatives represents another major opportunity, fostering innovation and the development of integrated regional ecosystems. Moreover, the integration of sustainable tourism with local food production offers the potential for diversified income streams and new circular value chains, aligning economic growth with environmental sustainability. By leveraging these opportunities, the region can stimulate inclusive rural development and increase resilience within its bio-based economy.

Threats

Several external threats pose challenges to the region's capacity for long-term bioeconomic transformation. Political instability and short-term regulatory changes undermine strategic continuity and create uncertainty for investors and stakeholders. Persistent governance and corruption challenges at the national level further weaken institutional credibility and risk slowing progress in regional governance reforms. Demographic pressures, including population decline and high youth inactivity rates, threaten the future availability of skilled labor and innovation capacity. In addition, the North Aegean's economic marginalization, reflected in GDP and income levels far below national and EU averages, continues to constrain competitiveness and investment potential. Collectively, these threats highlight the need for consistent, transparent, and long-term policy measures to safeguard the region's bioeconomic development.

Potential areas of action for improving governance performance in the North Aegean

Improving governance performance in the North Aegean requires strengthening coordination, transparency, and participation mechanisms across regional institutions. Developing a dedicated regional bioeconomy strategy with clear objectives and cross-sectoral coordination could address the current fragmentation in policy implementation. Enhancing citizen participation and accountability frameworks would increase the legitimacy and inclusiveness of decision-making processes. Capacity-building efforts should target the absorption and strategic use of EU and national funding to ensure more effective and sustainable results. Strengthening judicial independence and regulatory stability would help build investor confidence and improve the business environment. To overcome constraints, improvements in entrepreneurial education, funding opportunities, improved access to distribution networks, and the development of innovative business models are needed in the region. Investing in local networks and community-based initiatives can improve regional resilience and support the long-term sustainability of the circular bioeconomy in the North Aegean. Finally, fostering collaboration between academia, industry, and cooperatives can support evidence-based policy design and more resilient governance structures for the region's circular bioeconomy transition.

4.3 Pannonian Croatia, Croatia

Figure 5: Map of NUTS 2 subdivisions in Croatia.



Created with MapChart

As documented in RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), Pannonian Croatia is progressing in its transition toward a circular bioeconomy by utilizing its strong agricultural and forestry sectors, focusing on renewable biological resources for food, feed, and bioenergy. The region is implementing sustainable innovations such as precision and organic farming, cooperative business models, and digital agriculture, all based on a firm commitment to soil health and biodiversity preservation. New bio-based value chains include biomass pellets, biofuels, bioplastics, and specialty food products, indicating a clear move toward regenerative agricultural systems. Although the supportive policies provided by the National Rural Development Program, the draft Croatian Bioeconomy Strategy, and various EU-funded projects, progress remains limited by ongoing infrastructure gaps, restricted access to finance, outdated regulations, and low consumer awareness of bio-based products.

4.3.1 Socio-Economic Profile

The inland region of Pannonian Croatia (highlighted in dark green in Fig. 5) is the country's second largest region, covering 23,220 km² in north-eastern Croatia. The region accounts for 41% of the country's total land area. In 2024, the population of Pannonian Croatia was 990,636 people, accounting

for 25% of the total Croatian population. Pannonian Croatia is the country's economically weakest area, with a total GDP at current market prices of €14,167.6 million and a GDP per capita of €13,900 per person, which was much lower than the Croatian average GDP of €19,800 per inhabitant in 2023. Comparing the economic performance with the most economically developed region of Croatia, City of Zagreb, a significant gap of 66 % becomes evident¹. The low economic performance is also reflected at the county level, as the five lowest-income counties² in the country are located in Pannonian Croatia (Eurostat, 2025; OECD, 2024).

Pannonian Croatia boasts the second-highest net turnover for innovative enterprises among Croatian regions, recording €10,229,757 thousand in 2022. This indicates a strong capacity for economic diversification and innovation, which are crucial for supporting the bioeconomy evolution. The innovation potential of Pannonian Croatia has been recognized by the Regional Innovation Valleys Initiative, which selected it and 146 other European regions for its commitment to improving coordination and direction of their research and innovation (R&I) investment and policies (*Regional Innovation Valleys*, 2025). In 2023, GVA in the agricultural sector (NACE A) was €1,342.61 million, while manufacturing (NACE C) contributed €2,004.13 million. Although NACE A is entirely part of the bioeconomy sectors, only portions of NACE C and D align with bioeconomic objectives, indicating caution when attributing overall GVA contributions to the bioeconomy transition. Regional GVA data for NACE D is unavailable. Employment in agriculture, forestry, and fishing (NACE A) was highest in Pannonian Croatia among Croatian regions, with 38,900 workers in 2024. Industry employment (NACE B-E) reached 85,900, reflecting significant industrial activity that supports bioeconomic sectors. However, the overall employment rate was 51%, below the national (57.3%) and EU averages (61.7%), highlighting underlying labor market challenges. Employment and unemployment rates differ by gender, with men showing higher employment at 66.7% compared to women at 46.6%. These disparities persist across the labor market, emphasizing the need for policies to address gender gaps in employment opportunities and conditions (Eurostat, 2025).

Education data shows early school leaving is low at 2.4%, but adult participation in education and training (ages 25-64) is only 4.4%. Unemployment drops significantly with higher educational attainment, underscoring education's role in improving employability and supporting bioeconomic sectors. The economic activity rate for the population (ages 15-74) is 54.9%, slightly below the national average. Young adults (ages 25-34) exhibit a high economic activity rate at 88.8%, indicating a potential focus area for bioeconomy sector development. The emphasis on educational attainment suggests a well-prepared young workforce, although the overall employment rate for ages 20-64 (67.2%) remains below national and EU averages (Eurostat, 2025).

In 2022, annual household income in Pannonian Croatia was € 8,700 per person, significantly below national and EU levels. The income quintile share ratio of 5 indicates income inequality aligned with the national average, suggesting areas for policy intervention to promote equitable growth (Eurostat, 2025).

¹ In relation to the GDP per capita in 2021.

² Sisak-Moslavina, Vukovar-Srijem, Slavonski Brod-Posavina, Požega-Slavonia, and Virovitica-Podravina.

4.3.2 Self-assessment of Existing Governance Practices

The governance self-assessment conducted under the RIBES framework reveals significant structural weaknesses that constrain Pannonian Croatia's transition toward CBE.

Voice and Accountability are assessed as weak, with limited citizen engagement in political decision-making and restricted opportunities for public dialogue beyond formal hearings in the final legislative stages. While basic transparency mechanisms exist through the publication of decisions on official websites, participation rights remain uneven, and both media independence and freedom of expression are perceived as constrained. These governance limitations could restrict the capacity to build broad-based societal support for bioeconomy initiatives and could hinder inclusive policy design.

Regulatory Quality is likewise perceived as a major obstacle. Market access is hampered by high administrative burdens, and businesses face significant uncertainty due to unstable and unpredictable regulatory frameworks. Strong state intervention in markets persists, with limited guarantees for long-term planning and a financial sector viewed as inadequately supervised and vulnerable to political influence.

Government Effectiveness presents a mixed picture. Citizens enjoy relatively reliable access to basic public services, yet concerns about efficiency and responsiveness remain widespread. Administrative processes are perceived as neither fully professional nor independent, and policymaking suffers from a lack of strategic orientation and limited adaptability. Budgetary transparency exists in principle, but it fails to translate into meaningful citizen awareness or engagement. Meanwhile, investments in key sectors, such as innovation and infrastructure, are not consistently planned or implemented.

The Rule of Law emerges as one of the weakest governance dimensions in Pannonian Croatia. Judicial independence, enforcement of contracts and property rights, trust in law enforcement, and the predictability of the legal system are all rated very negatively. Such conditions could not only compromise business security but also erode trust among citizens and stakeholders, creating an adverse environment for long-term investments in bio-based industries.

Control of Corruption further compounds these challenges. Respondents note that citizens and businesses experience widespread prevalence, with negative impacts on service access and market competition. Although legal frameworks to combat corruption formally exist, enforcement is weak, accountability mechanisms are limited, and elites or private interests often influence political decision-making. Respondents indicate that the media and civil society face barriers to effectively exposing corruption, and whistleblowing remains an underdeveloped practice.

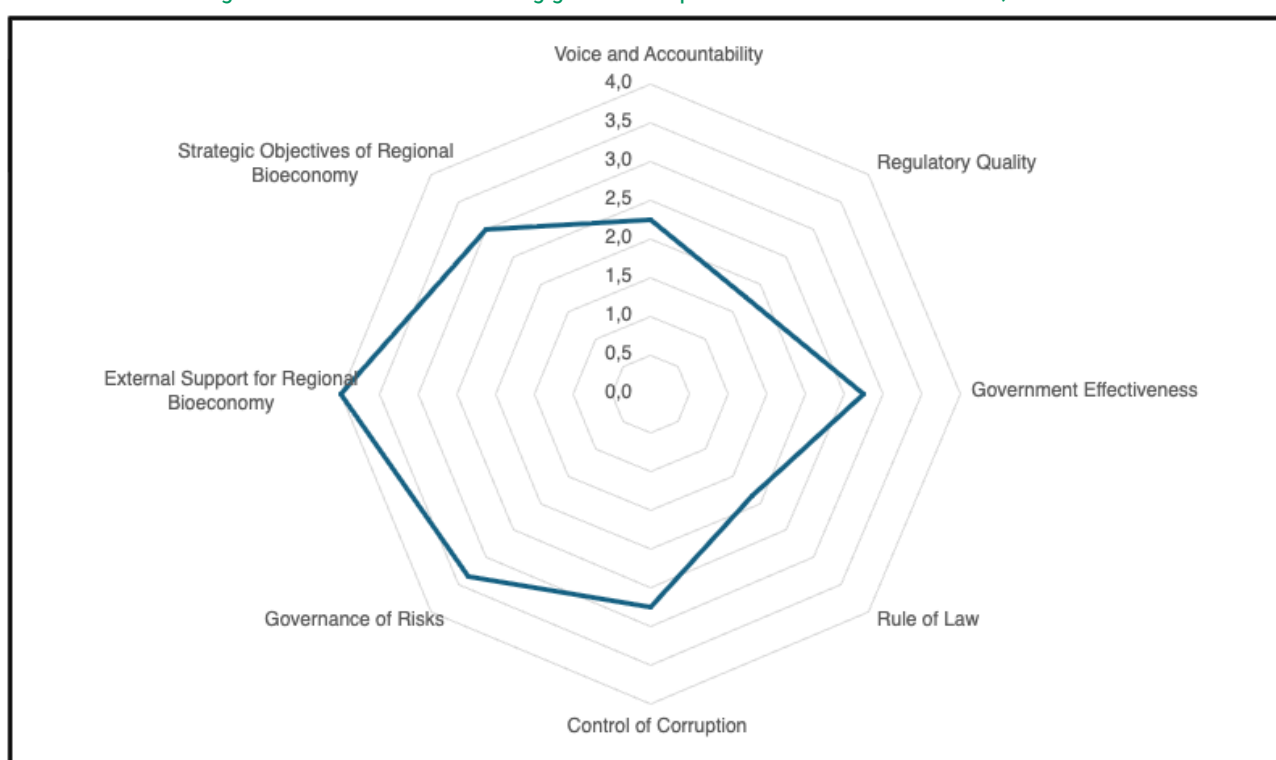
In contrast, the governance of bioeconomy-specific risks appears more promising. With regard to *Governance of Risks*, the trade-offs related to the bioeconomy concept are recognized in ecological, economic, and social terms in the region. However, since the bioeconomy strategy has not yet been formally adopted, mechanisms for risk monitoring and adaptive policy responses remain absent.

A notable strength lies in the region's access to *External Support for Regional Bioeconomy*. EU funding instruments, national programs, and international initiatives are widely recognized and utilized, particularly by businesses. Support measures are considered well-structured, thematically diverse, and tailored to regional needs, with a demonstrable positive impact on bioeconomy development. Crucially, such support is embedded in long-term partnerships and capacity-building initiatives, providing continuity and sustainability that partly compensates for domestic governance weaknesses.

Finally, regarding the *Strategic Objectives of Regional Bioeconomy*, the existence of a draft national Bioeconomy Strategy until 2035 reflects an important step toward a structured transformation pathway. Yet, as long as the strategy remains in draft form, its capacity to provide clear objectives, measurable indicators, and coordinated implementation remains limited. Stakeholders report only a neutral perception of policy integration, adaptability, and tangible results. The active involvement of industries, research institutions, and civil society in implementation processes is not yet evident, underscoring the need for stronger institutional coordination and stakeholder engagement once the strategy is adopted.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Voice and Accountability*, *Strategic Objectives of Regional Bioeconomy*, *Rules of Law*, *Regulatory Quality*, *Control of Corruption*, and *Government Effectiveness* (Fig. 6).

Figure 6: Assessment of existing governance practices in Pannonian Croatia, Croatia.



4.3.3 SWOT Analysis of Existing Governance Practices

Evaluating the self-assessment alongside the contextual factors of Pannonian Croatia yields significant implications for the governance system pivotal in steering a circular bioeconomy transformation.

Strengths

Pannonian Croatia benefits from substantial and well-structured external support for the development of its regional bioeconomy. EU, national, and international funding programs are widely accessed and effectively tailored to local needs, ensuring continuity and long-term stability. This external assistance partially offsets domestic governance weaknesses by fostering enduring partnerships and building institutional capacity. Moreover, the existence of a draft national Bioeconomy Strategy until 2035 demonstrates an emerging strategic framework that aligns the region with EU sustainability and circular economy objectives. The positive impact of external funding is already evident through tangible benefits for business innovation and skills development, contributing to the gradual establishment of a regional bio-based industry ecosystem.

Weaknesses

Despite progress in strategic planning, significant governance challenges persist in Pannonian Croatia. Weak mechanisms for voice and accountability limit citizen participation and public dialogue, while constrained media independence reduces transparency and trust. Poor regulatory quality and heavy administrative burdens continue to discourage business investment and innovation by creating uncertainty and inefficiency. The rule of law remains fragile, with limited judicial independence and weak enforcement of contracts and property rights, eroding institutional credibility. Furthermore, widespread corruption and elite influence over decision-making undermine fairness, accountability, and confidence in public institutions. These are factors that collectively impede the region's capacity to effectively implement circular bioeconomy initiatives.

Opportunities

Pannonian Croatia can leverage several external opportunities to accelerate governance and bioeconomy transformation. EU and international funding mechanisms provide robust frameworks for supporting innovation, entrepreneurship, and capacity building at the regional level. These instruments can help address domestic governance deficits while enhancing local institutional resilience. The forthcoming adoption of the national bioeconomy strategy offers an opportunity to define clear objectives, performance indicators, and coordination mechanisms between stakeholders. Once implemented, this strategic framework could strengthen policy coherence, align regional priorities with national and EU goals, and enable more inclusive and sustainable development pathways.

Threats

The regional transition toward a circular bioeconomy faces several critical external threats. Persistent governance and corruption challenges at the national level may undermine reform efforts and reduce the effectiveness of external financial support. Regulatory instability and the politicization of administrative processes further weaken investor confidence and jeopardize long-term policy continuity. The delayed adoption of the national Bioeconomy Strategy limits clarity in objectives and hampers stakeholder engagement, while low societal trust in institutions poses an additional barrier to

participatory and inclusive governance. These threats collectively risk slowing the translation of strategic visions into concrete, sustainable outcomes.

Potential areas of action for improving governance performance in Pannonian Croatia

To strengthen governance performance and unlock the region's bioeconomy potential, targeted action is needed in several key areas. Enhancing transparency, accountability, and citizen participation should be prioritized to build public trust and legitimacy in policymaking. Streamlining regulatory frameworks and reducing administrative burdens would improve the business environment and encourage private investment. Efforts to reinforce judicial independence and ensure consistent law enforcement are essential for restoring confidence among investors and stakeholders. Moreover, anti-corruption measures must be strengthened through better monitoring, enforcement, and civic oversight. Finally, aligning regional governance mechanisms with the forthcoming national bioeconomy strategy and leveraging EU capacity.

To overcome the region-specific challenges, governance approaches should further focus on increasing research and innovation funding, modernizing and harmonizing regulations to facilitate market entry for sustainable products, and enhancing consumer education. Building stronger collaboration among research institutions, policymakers, and industry stakeholders will be essential for promoting regenerative practices and ensuring the long-term success of Pannonian Croatia's transition to a circular bioeconomy.

4.4 Campania, Italy

Figure 7: Map of NUTS 2 subdivisions in Italy.



Created with MapChart

Based on the findings published in RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), Campania has great potential for developing a circular bioeconomy, thanks to its strong agricultural foundation and expanding food, beverage, and marine industries. The region is actively working to incorporate technological innovation into industrial and agricultural processes to encourage sustainable practices and create a variety of bio-based products. Social innovation is vital in tackling environmental damage caused by organized crime, highlighting the urgent need for better governance, enforcement of regulations, and community participation. Principles of the circular economy are increasingly used in waste management and sustainable food systems, with emerging bio-based value chains in agri-food, bioplastics, marine biotechnology, organic fertilizers, nutraceuticals, and sustainable fisheries. Despite a vibrant ecosystem supported by universities, the Terra Next incubator, and local cooperatives, the region faces ongoing challenges such as stiff competition from fossil-based industries, poor infrastructure, complex regulations, and the persistent influence of criminal networks.

4.4.1 Socio-Economic Profile

Campania (highlighted in dark green in [Fig. 7](#)), located on Italy's southern coast, has a population density of 410.8 people per km², making it one of Italy's most densely inhabited areas: in 2024, about 5.6 million people lived in the area of 13,670 km². Despite having a comparatively large GDP at current market prices of total €1,230,265.49 million in 2023, Campania's economic performance reflected the broader declining economic trend in southern Italy. In a nationwide comparison, the area comes third from last, with a per capita GDP of €23,300, which is much lower than the Italian average of €36,100 per person (Eurostat, 2025).

Nevertheless, Campania has significant economic potential, especially in renewable energy. Since 2018, the region has attracted substantial foreign direct investment (FDI) in this sector, showing its appeal to international investors and offering a chance to boost the regional economy over the long term. Besides tourism, agriculture is also a key economic sector in this area. Persistent structural weaknesses and socio-economic disparities continue to characterize the region, partly due to the influence of organized crime (OECD, 2024).

In Campania, the intersection of socio-economic indicators draws a clear picture of the region's ongoing struggles and possible chances for bioeconomy growth. The region's economic data, especially regarding turnover, remains largely unexplored due to missing information on innovative companies in 2022. However, GVA figures in bioeconomy sectors give insight into economic activity. With a GVA of €3,054.7 million in agriculture (NACE A) and €11,415.5 million in manufacturing (NACE C), the data highlights agriculture's central role in Campania's economy, though caution is needed because NACE C and D are only partially included in bioeconomic sectors. Regional GVA data for NACE D is unavailable (Eurostat, 2025).

Employment data reveals a complex picture, with 69,600 people working in agriculture, making Campania one of Italy's leading regions for farming jobs. Industry employment at 225,400 is also notable. However, the overall employment rate of 40.3% falls short of national and EU averages, alongside a high unemployment rate of 15.6%, indicating major labor market challenges. Long-term unemployment at 9.9% is especially alarming, being much higher than national and EU levels. The region also exhibits significant gender inequalities. The employment rate for men is 52.6%, while that for women is significantly lower at 28.3%. Gender inequality in labor force participation is also clearly evident when considering the unemployment rate in the region, which at 17.8% is higher for women than for men (14.2%) (Eurostat, 2025).

Education levels in society point to troubling trends, such as high early school leaving rates at 13.3% and a large portion of the population with less than secondary education. Age groups also reveal concerns. Employment and labor force participation rates are well below the Italian and EU averages, particularly in the key age group of 20–64-year-olds, where the employment rate is only 49.4%. These figures suggest that many young workers are not fully engaged or do not have the skills required for emerging sectors that could potentially be relevant to the transition to bioeconomy in the region. Income levels in Campania, with an average household income of €14,500 per person, are far below national and EU averages, and the high-income quintile share ratio of 6.4 points to significant income inequality. These wealth gaps may create barriers to inclusive growth and access to opportunities (Eurostat, 2025).

4.4.2 Self-assessment of Existing Governance Practices

The self-assessment of the Campania region shows a mixed picture across key governance dimensions relevant to the development of the regional bioeconomy. In terms of *Voice and Accountability*, it is noted that citizens have limited influence in political co-creation processes and do not see equal and fair participation rights for all groups. Political dialogue methods like workshops and forums are attended to some degree, but public access to trustworthy information about political decisions is rated neutrally. The regional media landscape is viewed as neither clearly independent nor repressive, and freedom of public expression is also rated neutrally.

Regarding *Regulatory Quality*, respondents recognize significant challenges in market access and starting businesses, and regard regulations as unstable and influenced by short-term political shifts. State intervention in the market and price-setting is viewed as moderate, while the financial sector is officially supervised but not considered protected from political influence or regulatory failures.

In terms of *Government Effectiveness*, public services such as education, healthcare, and transportation are available but not always seen as efficient or aligned with citizens' needs. Public administration is not perceived as independent from political interests. Although administrative procedures are assessed neutrally, it is noted that confidence in the professionalism of civil servants is limited. It is noted that, although policy development and implementation are based on long-term strategies, their effectiveness, flexibility, and efficiency are rated as average. In addition, shortcomings were identified in the communication of information to citizens about public budget management.

Concerning the *Rule of Law*, there is limited trust in the independence and fairness of the judiciary. Contract enforcement and protection from state intervention are viewed more favorably, while confidence in law enforcement agencies and legal predictability remains neutral.

The results of the self-assessment on *Control of Corruption* indicate adverse evaluations. Corruption is considered widespread and hampers access to public services. Although legal frameworks are in place to fight corruption, their effectiveness is questioned by the respondents. Public officials are expected to adhere to ethical standards, but political decision-making is seen as being influenced by elites and private interests. Journalists and civil society groups encounter barriers when reporting on corruption, and protections for whistleblowers are rated neutrally.

Under the dimension of *Governance of Bioeconomy Risks*, the regional bioeconomy strategy acknowledges potential social, environmental, and economic trade-offs only to a limited extent. There are no clearly defined political measures to address these risks, although monitoring mechanisms exist to some degree.

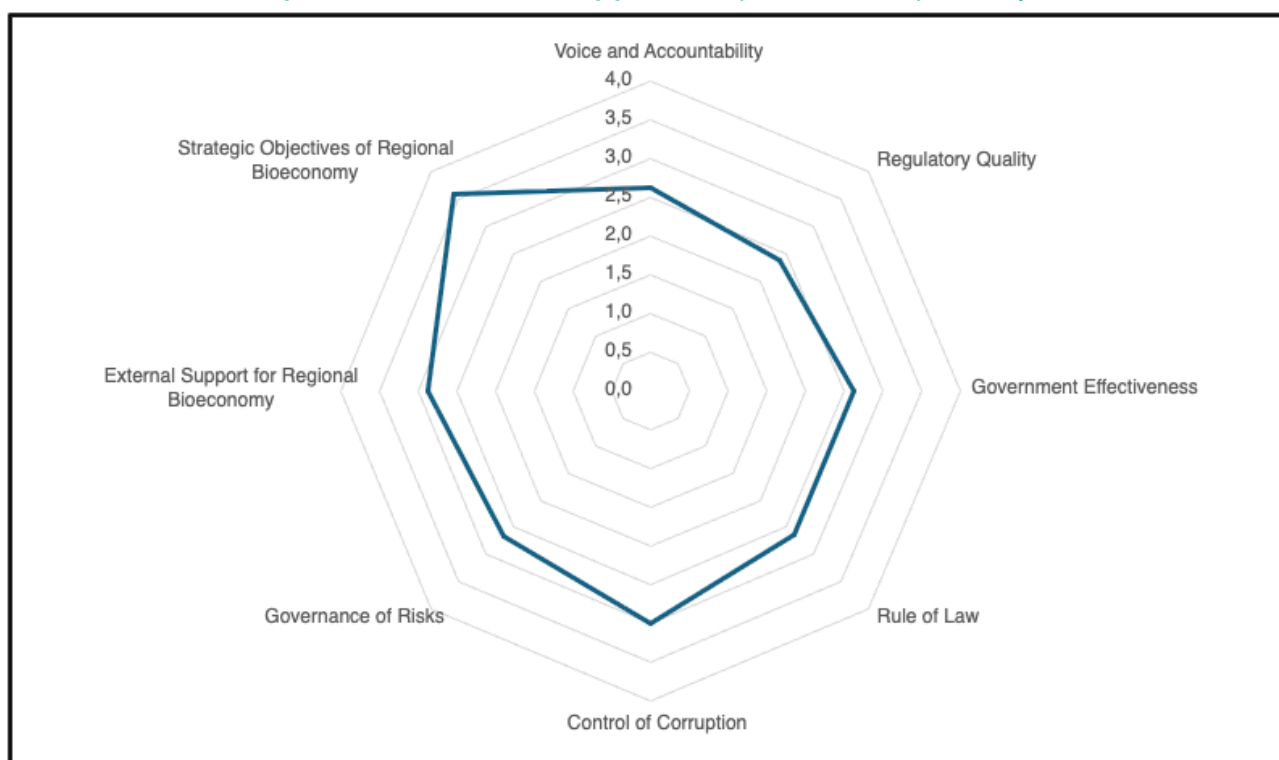
Regarding *External Support for Regional Bioeconomy*, it is stated that citizens and businesses are aware of available support measures from the EU, national or international institutions, though actual access is more limited. The structure of this support is not considered well-aligned with regional priorities, and its effectiveness and long-term sustainability are rated as neutral. Finally, Campania is assessed to have clearly formulated *Strategic Objectives of Regional Bioeconomy* with defined goals and adaptable to new developments. However, the existence of measurable indicators is rated as neutral. The strategy is seen as integrated with other policy areas and is considered to be implemented through visible actions. However, it is noted that citizens and businesses are less aware of financial and regulatory efforts or tangible results of externally supporting the regional bioeconomy strategy. Active

involvement of industry, research, and civil society is recognized, and innovative projects are being implemented as part of the strategy, though the overall regional impact is still assessed neutrally.

All in all, the governance environment in Campania presents a complex yet crucial landscape for supporting the region's bioeconomy transformation. Despite the region's considerable economic potential, driven by its strong agricultural base, expanding food and marine sectors, and emerging renewable energy investments, ongoing governance challenges hinder a fully effective transition.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Voice and Accountability*, *Strategic Objectives of Regional Bioeconomy*, *Rules of Law*, *Regulatory Quality*, *Governance of Risks*, and *Government Effectiveness* (Fig.8).

Figure 8: Assessment of existing governance practices in Campania, Italy.



4.4.3 SWOT Analysis of Existing Governance Practices

Based on the self-assessment and socio-economic analysis of the Italian region of Campania, several conclusions can be drawn regarding the governance framework for a successful transition to a circular bioeconomy.

Strengths

Campania benefits from a strong agricultural base combined with growing food, beverage, and marine industries. This provides a solid foundation for developing bio-based value chains and advancing the regional circular bioeconomy. The region also hosts a vibrant ecosystem of universities, cooperatives, and innovation hubs, such as the Terra Next incubator, which fosters research and accelerates technology transfer. Cross-border cooperation with other Mediterranean regions also offers a strategic opportunity to improve resilience, share knowledge, and attract more investment. Furthermore, Campania has clearly defined strategic objectives for its bioeconomy, ensuring alignment with other policy areas and providing direction for coordinated action. Active involvement of industry, research actors, and civil society strengthens multi-stakeholder engagement, supporting innovation and increasing the legitimacy of bioeconomy policies.

Weaknesses

The self-assessment of the region's governance framework reveals significant weaknesses in governance quality, including limited citizen participation and accountability, regulatory instability, moderate government effectiveness, and widespread concerns about corruption and judicial independence. These weaknesses can limit the region's ability to implement and enforce measures to promote bio-based innovation and sustainable practices. In addition, governance issues such as political influence on public administration and the judiciary can weaken legal certainty and the rule of law, which are crucial for business confidence and sustainable development. Furthermore, limited coordination and awareness of external support mechanisms, as well as only partially defined strategies for managing bioeconomy risks, suggest that the governance system is still evolving.

The socioeconomic environment, characterized by high unemployment, gender inequalities, educational disparities, and income inequality, can create significant barriers to inclusive growth and employability in emerging bioeconomy sectors. Infrastructure deficits, complicated regulations, and competition from the fossil fuel industry can exacerbate these challenges, while the influence of organized crime continues to threaten social cohesion and the legitimacy of governance.

Opportunities

Campania has a significant opportunity to strengthen its bioeconomy through better use of EU and national funding instruments. Although awareness of external support structures already exists, improving access and alignment with regional needs could help overcome governance and financial constraints. This external support can provide critical resources for investment, capacity building, and innovation, ultimately reinforcing regional competitiveness and accelerating the bio-based transition.

Threats

Several external threats may slow down or undermine Campania's bioeconomy development. The persistent influence of organized crime could weaken environmental governance and deter investors. Pronounced socio-economic disparities risk could limit public support for transformative measures.

Regulatory and political instability, combined with demographic and labor market challenges, may delay long-term strategic investments and restrict the availability of skilled labor. Additionally, weak governance and corruption at both regional and national levels could neutralize the impact of external support and limit the effectiveness of bioeconomy strategies.

Potential areas of action for improving governance performance in Campania

To enhance governance performance, Campania could focus on increasing institutional transparency, strengthening accountability mechanisms, and reducing corruption to build trust among stakeholders. Improving regulatory stability and simplifying bureaucratic procedures would make the region more attractive for private investment and innovation. Enhancing citizen participation and strengthening multi-actor governance structures could foster more inclusive and effective policy implementation. Furthermore, governance tailored to the region must focus on attracting private investment, providing targeted incentives for bio-based startups, enhancing environmental law enforcement, and modernizing waste management. Strengthening public-private partnerships and building cross-border collaborations with other Mediterranean regions are also crucial for scaling innovation, building resilience, and ensuring the long-term sustainability of Campania's circular bioeconomy transition.

Finally, improving the region's capacity to access and strategically deploy EU and national funding would help address structural weaknesses and support a more resilient and innovation-driven bioeconomy.

4.5 Western Balkans

Figure 9: Map of six Western Balkan countries.



The Western Balkans region comprises the nations of Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia (Fig. 9). The combined area of these countries is 218.854 km²¹, with a total population of 16.841.395 inhabitants² according to recent statistics. Rural development and agriculture are priorities for all Western Balkan countries. Nevertheless, they are severely affected by climate change and the associated environmental problems that impact agriculture, forestry, and water supply. This is a critical factor, as in the Western Balkans, the primary

¹ Albania: 28.748 km², Bosnia and Herzegovina: 51.197 km², Kosovo: 10.887 km², Montenegro: 13.810 km², North Macedonia: 25.713 km² and Serbia: 88.499 km².

² Albania: 2.761.785 (in 2023), Bosnia and Herzegovina: 3.422.000 (in 2023), Kosovo: 1.602.515 (in 2024), Montenegro: 623.680 (in 2024), North Macedonia: 1.826.247 (in 2024) and Serbia: 6.605.168 (in 2024).

sector contributes to combating unemployment, migration, and environmental sustainability (ASK, 2025; BHAS, 2025; Eurostat, 2025; INSTAT, 2025).

Across the Western Balkans, biomass production, including biogas, biodegradable materials, and forestry-based bio-products, plays a crucial role in the bioeconomy. However, according to RIBES Deliverables 2.1 and 2.2, gaining acceptance for bioeconomic practices is especially important in this region. Specifically, strengthening the political framework and implementing concrete initiatives to promote social innovations and develop the bioeconomy are key actions for a successful transition. Despite the potential of strong actors such as national and regional rural development networks, international partnerships, and political decision-making bodies, fragmented regulations and limited investments in bioeconomy projects remain. Therefore, capacity building, harmonized political frameworks, and increased cross-border cooperation are essential.

4.5.1 Socio-Economic Profile

The combined area of the Western Balkan countries is 218.854 km²¹, with a total population of 16.841.395 inhabitants² according to recent statistics. Rural development and agriculture are priorities for all Western Balkan countries. Nevertheless, they are severely affected by climate change and the associated environmental problems that impact agriculture, forestry, and water supply. This is a critical factor, as in the Western Balkans, the primary sector contributes to combating unemployment, migration, and environmental sustainability (ASK, 2025; BHAS, 2025; Eurostat, 2025; INSTAT, 2025).

The Western Balkans benefit from a range of tangible and intangible strengths that could support a successful bioeconomy transformation. On the resources side, the region has a solid biomass production base, including agricultural outputs, forestry products, and biogas potential, which are directly aligned with key bioeconomy sectors. The presence of active local actors, such as development agencies, research institutions, and grassroots initiatives, shows an existing pool of capacity and motivation at the community level. Furthermore, external partnerships, especially with EU institutions, international donors, and cross-border cooperation programs, have been viewed positively in terms of structure, effectiveness, and sustainability. In fact, the European Commission's Regional Innovation Valleys Initiative has already recognized three regions (Tuzlanski kanton in Bosnia and Herzegovina, Montenegro, and North Macedonia) from the Western Balkans due to their commitment to strengthening research and innovation potential (*Regional Innovation Valleys*, 2025).

In the case of the Western Balkans, this section does not include any quantitative socio-economic indicators. Although such data could offer extra context, the six countries in the region (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia) vary significantly in their economic size and structure. These differences make it difficult to present aggregated or average data that would accurately represent the entire region. On the other hand, providing country-specific figures would require an extensive and detailed analysis that goes beyond the scope of this section. Therefore,

¹ Albania: 28.748 km², Bosnia and Herzegovina: 51.197 km², Kosovo: 10.887 km², Montenegro: 13.810 km², North Macedonia: 25.713 km² and Serbia: 88.499 km².

² Albania: 2.761.785 (in 2023), Bosnia and Herzegovina: 3.422.000 (in 2023), Kosovo: 1.602.515 (in 2024), Montenegro: 623.680 (in 2024), North Macedonia: 1.826.247 (in 2024) and Serbia: 6.605.168 (in 2024).

the focus remains on the results of the governance framework self-assessment, which provides a comparable and thematically relevant basis for analysis across all six countries.

4.5.2 Self-assessment of Existing Governance Practices

The self-assessment of governance structures in the Western Balkans shows that, with few exceptions, the overall governance system is seen as subpar in most areas (see [Section 2.2](#)). Regarding *Voice and Accountability*, stakeholders reported limited citizen participation in policymaking, a lack of political transparency, weak protections for participatory rights, and restricted freedom of expression for citizens and the media. This points to a democratic gap that could erode trust in government institutions and challenge the legitimacy of policies.

The negative trend continues in the assessment of *Regulatory Quality*, where administrative and political hurdles are viewed as obstacles to starting a business and accessing markets. Regulations are often seen as inconsistent and unpredictable, and government interference in markets is seen as more obstructive than supportive. While the regulation of the financial sector is rated as neutral due to effective state supervision that protects both investors and consumers, concerns persist regarding potential regulatory failures and the risk of political manipulation.

Deficiencies are also apparent in the area of the *Rule of Law*. Factors relating to the independence and fairness of the judiciary, the enforcement of contracts, trust in law enforcement, and the stability of the legal system are rated as inadequate. In contrast, the protection of property rights is rated as neutral.

Participants perceive *Government Effectiveness* as ranging from neutral to insufficient. While some aspects, such as budget transparency and the long-term focus of public administration, are viewed more positively, there are concerns about the efficiency of public investments and services, especially in rural regions. Implementation and adoption of political measures are often seen as inadequate, and the independence of public administration remains problematic.

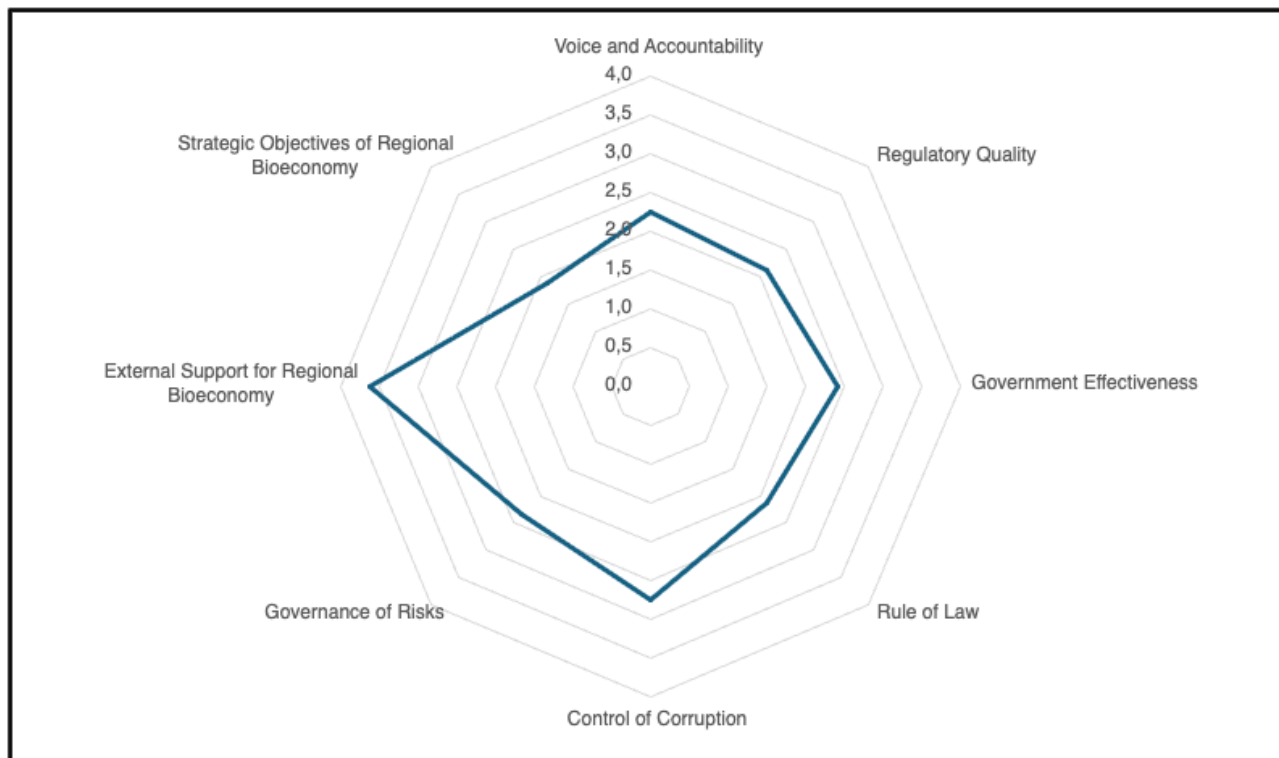
Regarding the *Control of Corruption*, assessments in the Western Balkans vary from neutral to unsatisfactory. Although citizens, journalists, and businesses are rated as relatively capable of detecting and preventing corruption, critical issues still exist. These include weak protections for whistleblowers, limited accountability of public officials, and unfair pressure on businesses from competitors or politically connected actors. This indicates that corruption is a systemic issue deeply rooted in political and economic structures.

Regarding bioeconomy governance indicators, Western Balkans members rated the political identification of risks related to transitioning to a bioeconomy as neutral. However, they disagreed on the presence and effectiveness of political measures, monitoring mechanisms, and a regional bioeconomy strategy. This indicates an imbalance between grassroots initiatives and top-down approaches. While local actors are actively involved, there is a lack of political leadership and coordination to fully realize the bioeconomy's potential. Conversely, *External Support for Regional Bioeconomy* is viewed more positively. Stakeholders praise the structure, effectiveness, and sustainability of these external measures as key strengths. This positive perception of external assistance could help fill gaps created by inefficient local governance, but might also lead to dependence on external actors if sustainable regional frameworks are not developed.

Overall, self-assessment shows a generally critical view of governance in the Western Balkans. In nearly every evaluated area, institutional performance is deemed subpar, highlighting fundamental structural issues that could hinder progress, especially in the bioeconomy sector.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in almost all areas, except *External Support for Regional Bioeconomy* (Fig. 10).

Figure 10: Assessment of existing governance practices in the Western Balkans.



4.5.3 SWOT Analysis of Existing Governance Practices

The self-assessment, combined with its contextual analysis, presents critical observations regarding the governance models required to enable a circular bioeconomy shift.

Strengths

The Western Balkans region benefits from a number of structural strengths that provide a solid foundation for advancing the circular bioeconomy. The presence of active local actors and networks, including development agencies, research institutions, and grassroots initiatives, demonstrates a strong level of local capacity and motivation to support bottom-up transformation processes. These actors are well-positioned to drive innovation at the regional level and ensure local ownership of bioeconomy initiatives. In addition, the region maintains positive partnerships with EU institutions, international donors, and cross-border cooperation programs. These external collaborations are perceived as structured, effective, and sustainable, offering access to technical expertise, financial resources, and governance best practices. Finally, the recognition of three regions under the European Commission's Regional Innovation Valleys Initiative signals growing alignment with EU innovation priorities. This increased visibility can attract further investment and facilitate integration into EU-wide research and innovation networks.

Weaknesses

However, these strengths are threatened by structural governance weaknesses that create serious barriers to transformation. Limited citizen participation in policymaking and low levels of institutional transparency weaken legitimacy and reduce societal support for long-term strategies. Regulatory instability, along with unpredictable government interventions, creates uncertainty for investors, discourages innovation, and limits private-sector involvement in emerging bioeconomy markets. Gaps in the rule of law, particularly regarding judicial independence and contract enforcement, further erode trust between economic actors and public authorities. Ongoing corruption risks, combined with inadequate whistleblower protections and political influence in business competition, foster an environment where rent-seeking may overshadow innovation-driven entrepreneurship. The absence of a clear, region-wide bioeconomy strategy worsens these issues, as local initiatives remain scattered and are not effectively scaled through coordinated political leadership.

Opportunities

Opportunities exist in bridging the gap between active local stakeholders and underperforming governance structures. External partners can serve a catalytic role, but to prevent dependency, regional actors must build sustainable governance capacities. Improved cross-border cooperation among the six Western Balkan countries could standardize regulations, enhance policy coherence, and attract investments by creating a more predictable regulatory environment. Additionally, aligning bioeconomy strategies with rural development and climate adaptation goals could generate synergies between economic growth, environmental resilience, and social inclusion. The main challenge will be transforming the current patchwork of initiatives into a structured, multi-level governance system that can maintain political support beyond individual projects or donor cycles.

Threats

Several external threats may impede progress if not addressed strategically. Political instability and regulatory unpredictability undermine long-term strategic planning and reduce investor trust, creating a challenging environment for sustainable bioeconomy development. The strong dependence on external actors, particularly EU and international support, risks creating structural dependency and weakening incentives to build robust domestic governance capacity. The persistent democratic deficit and low societal trust may reduce public acceptance of bioeconomy transition measures, ultimately undermining policy legitimacy. Finally, corruption and elite capture of decision-making can lead to unfair competition, discourage private and foreign investment, and erode confidence in public institutions, making governance reforms and bioeconomy development more difficult to sustain.

Potential areas of action for improving governance performance in the Western Balkans

Strengthening governance performance in the Western Balkans requires targeted measures to address both structural weaknesses and external dependencies. A key priority is to enhance voice and accountability mechanisms, ensuring broader citizen participation, greater transparency, and improved access to reliable information. Strengthening regulatory quality through more stable, predictable, and harmonized policy frameworks would increase trust among investors and stakeholders while reducing administrative barriers. Equally important is the reinforcement of the rule of law and anti-corruption measures, including stronger whistleblower protections, more independent judicial systems, and improved enforcement capacities. Establishing a coordinated and coherent bioeconomy strategy at the regional level, supported by clear political leadership and effective monitoring mechanisms, can help bridge the current governance gaps. Finally, increasing domestic capacity and ownership of bioeconomy initiatives, rather than relying solely on external support, will be crucial for building long-term institutional resilience. This includes empowering local actors, improving inter-institutional coordination, and aligning national governance structures more closely with EU standards and innovation frameworks.

4.6 Podkarpackie, Poland

Figure 11: Map of NUTS 2 subdivisions in Poland.



Created with MapChart

As reported in RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), Podkarpackie is a rapidly growing region with strong agricultural and forestry foundations. It is well-placed to incorporate bioeconomy principles into its broader economic development. Utilizing its industrial base, the region is increasingly adopting innovations in biodegradable packaging, renewable materials, and environmentally friendly manufacturing processes. Emerging bio-based value chains include biogas and biofuels, wood pellets, organic fertilizers made from agricultural waste, and sustainable building materials. This shift is supported by the Regional Development Strategy, which aligns with national sustainability goals and benefits from EU-funded programs. Key institutions such as the University of Rzeszów, regional cooperatives, and clean-tech startups are actively driving innovation. However, the region faces specific challenges, including limited financial incentives for green innovation, underdeveloped waste valorization infrastructure, slow regulatory updates, and strong competition from traditional industries.

4.6.1 Socio-Economic Profile

The Podkarpackie Voivodeship (highlighted in dark green in [Fig. 11](#)) is located in northeastern Poland, bordering Ukraine and Slovakia. With nearly 2 million residents, the region ranks mid-range nationwide.

Although the total GDP in 2023 is also average¹, the GDP per capita at current prices is the second-lowest among all regions at €14,300 and is below the Polish average of €19,900, indicating low economic development in this area (Eurostat, 2025). Due to the extensive forest cover, the region is one of the most heavily wooded areas in Poland. As a result, forest-based and timber industries dominate in Podkarpackie. A diverse range of other industries, including aerospace, automotive, and food sectors, are also present in the region. Agriculture is prominent but fragmented, with many small-scale farmers. Additionally, the region is characterized by a high concentration of academic institutions, with 18 universities and about 70,000 students (Rzeszow Regional Development Agency, 2024).

In terms of economic performance, Podkarpackie's net turnover for innovative enterprises was approximately €14.3 billion in 2022, ranking among the lower tiers compared to other Polish regions. This modest turnover highlights the challenges in scaling innovation-driven activities, as shown by the GVA distribution in bioeconomy sectors. Agriculture, forestry, and fishing (NACE A) contribute €352 million, while manufacturing (NACE C) accounts for nearly €6 billion. Although NACE A is fully classified within the bioeconomy, partial overlaps with manufacturing require cautious interpretation of these figures, indicating a substantial industrial base that could be leveraged for bio-based value chains if governance policies adequately support sector integration and innovation diffusion. Regional GVA data for NACE D is not available. Nonetheless, the innovation potential of the Podkarpackie region has been recognized by the Regional Innovation Valleys Initiative, which selects regions for their commitment to improving coordination and direction of their research and innovation (R&I) investments and policies (*Regional Innovation Valleys*, 2025).

The employment situation in Podkarpackie shows a labor force mainly engaged in primary sectors, with about 39,100 people working in NACE A, placing the region in the lower third nationally. Industrial employment (NACE B-E except construction) is relatively stronger, with over 212,000 workers, putting Podkarpackie near the national median. However, overall employment rates are still below both national and EU averages, at 56.2% compared to Poland's 62% and the EU's 61.7%, indicating underutilized human capital. The region has slightly higher unemployment at 3.7%, above the national average of 2.9%, along with a notable rate of long-term unemployment at 1.4%. Labor market slack at 5.8% suggests unused labor potential that policies could address through targeted training and employment programs (Eurostat, 2025).

Gender disparities in the labor market further complicate social dynamics affecting bioeconomic development. Women's employment rates are significantly lower than those of men, with only 48.9% of women employed versus 63.6% of men, both below their respective national and EU benchmarks. Unemployment rates among women are slightly higher than among men, and labor market slack is greater for women, pointing to systemic barriers to gender equality. Policies aiming to create an inclusive bioeconomy should focus on gender-sensitive approaches, promoting equal access to education, training, and jobs in green sectors (Eurostat, 2025).

Age-related employment patterns reveal additional challenges. The 15-24 age group has significantly lower employment and activity rates than national and EU averages, showing difficulties integrating into

¹ In 2023, the total GDP at current price was €28,379.06 million in Podkarpackie 2023.

the labor market. While participation is higher among core working age groups (25-34 and 20-64), they still fall short of broader benchmarks. This trend suggests that policies should focus on youth engagement, linking education and work transition programs with incentives to retain young talent in bioeconomy sectors, ensuring long-term sector resilience. Participation in education and ongoing training in Podkarpackie is notably low, with 6% of adults aged 25-64 involved in educational activities, below Poland's 10% and the EU's 13.5%. This gap affects the development of skills needed for a bioeconomy. However, the educational level of the population is relatively high, with over 95% holding at least an upper secondary degree or higher (Eurostat, 2025).

Finally, income levels highlight socioeconomic disparities that policies need to address to promote fair growth. The average household income per person in Podkarpackie is €8,400, well below Poland's average of €10,600 and the EU's €22,700 in 2022. The income quintile share ratio of 3.1, lower than Poland's 3.9, indicates moderate income inequality, but the overall low income limits local demand and investment potential (Eurostat, 2025).

4.6.2 Self-assessment of Existing Governance Practices

The governance framework in Podkarpackie presents a complex and somewhat ambivalent landscape for supporting the transition towards a bioeconomy. The region demonstrates a relatively robust strategic orientation, with bioeconomy objectives, broad stakeholder involvement, and tangible progress in implementation.

The self-assessment regarding the *Strategic Objectives of Regional Bioeconomy* indicates that regional actors widely acknowledge the existence of a coherent bioeconomy strategy. Respondents note that citizens and businesses are aware of concrete measures, including subsidies for bioenergy, biomass recycling initiatives, and start-up funding in biotechnology. Such institutional clarity provides a strong foundation for aligning bioeconomic development with EU and national sustainability agendas.

External Support for Regional Bioeconomy further reinforces these dynamics. The region benefits significantly from targeted programs, which are perceived as both accessible and effective. The regional Polish MTF members indicate that these measures are well-structured, diversified, and tailored to regional priorities, reaching the intended groups and fostering long-term partnerships. At the same time, the governance assessment reveals structural weaknesses that may constrain the effective realization of these opportunities.

A recurring challenge lies in the quality of *Voice and Accountability*. The assessment reflects a neutral perception of citizen participation and limited opportunities for structured political dialogue. More concerning is the reported weakness in freedom of expression, where both media independence and the ability of citizens to express opinions without fear are viewed critically. This suggests a governance environment where political communication is not fully inclusive, which risks undermining social legitimacy and the co-creation processes essential for embedding bioeconomic transformations within society.

Regulatory Quality and Government Effectiveness also present mixed results. While certain dimensions, such as the government's role in stabilizing markets and providing long-term policy orientations, are viewed positively, stakeholders express skepticism about regulatory predictability and the independence of public administration. The perception that public services lack efficiency, combined with doubts about the professionalism and transparency of administrative processes, highlights a gap

between formal policy ambitions and their operationalization. In practice, this can slow down the introduction of innovative bio-based business models, which depend on predictable regulatory frameworks and efficient support structures.

The performance category *Rule of Law* is assessed as moderately reliable, with confidence in contract enforcement and protection of property rights, but weaker perceptions regarding judicial independence and the predictability of legislative processes. This partial trust in legal institutions may discourage risk-taking among investors and reduce the willingness of firms to engage in long-term bioeconomy ventures, especially where significant upfront investments are required.

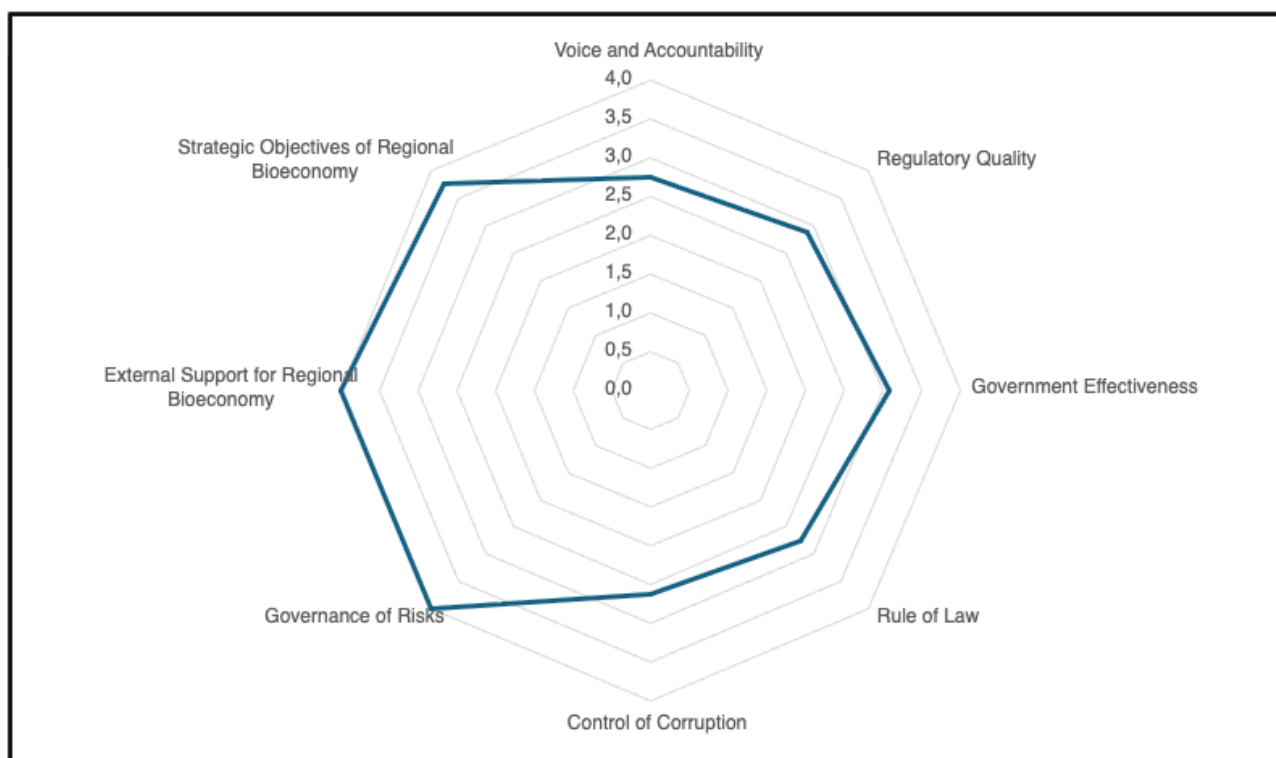
A similar discrepancy can also be observed with regard to *Control of Corruption*. Although corruption is not perceived to be widespread, concerns remain about the influence of elites or private interests on political decisions and about the ability of the media and civil society to investigate corruption freely.

On a more positive note, the *Governance of Bioeconomy Risks* appears comparatively advanced. Stakeholders agree that social, environmental, and economic trade-offs are recognized in regional strategies. Furthermore, there is evidence of concrete policy responses, monitoring mechanisms, and adaptive measures being in place.

Taken together, the governance self-assessment in Podkarpackie reveals a dual picture. On the one hand, strong strategic clarity, effective use of external support, and a proactive approach to risk governance. On the other hand, persistent deficits in citizen participation, regulatory stability, and the perceived independence of public administration.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Voice and Accountability*, *Regulatory Quality*, *Government Effectiveness*, *Rule of Law*, and *Control of Corruption* ([Fig. 12](#)).

Figure 12: Assessment of existing governance practices in the Podkarpackie, Poland.



4.6.3 SWOT Analysis of Existing Governance Practices

Following the self-assessment of the regional governance framework and the socioeconomic analysis of the Polish region of Podkarpackie, several conclusions can be drawn for a successful transition to a circular bioeconomy.

Strengths

Podkarpackie's bioeconomy potential relies on several structural strengths that provide a solid foundation for sustainable transformation. The region's diverse industrial base, including forestry, timber processing, aerospace, automotive, and food production, offers multiple opportunities for developing bio-based value chains. Agricultural production, although fragmented, remains extensive and supplies feedstocks for biogas, biofuels, and organic fertilizers. Furthermore, the high density of universities and students creates a high academic and research potential. This academic density not only supports knowledge creation but also promotes collaboration among science, industry, and policy, which is vital for accelerating innovation in emerging green sectors.

Weaknesses

The strengths of the Podkarpackie region are balanced by significant weaknesses that hinder the pace and inclusivity of the bioeconomy transition. Ongoing socio-economic challenges, such as low-income levels, skills shortages, gender gaps, and youth unemployment, as well as an insufficiently developed innovation infrastructure, present significant obstacles. Economic underdevelopment, reflected in one of the lowest GDP per capita levels in Poland and low household incomes, limits local investment capacity and market demand for high-value bio-based products. Innovation activity remains modest, with the region's turnover from innovative companies ranking among the lower tiers nationally. The labor market shows structural vulnerabilities, including low overall employment rates, above-average

long-term unemployment, and notable gender disparities in participation and access to opportunities. Particularly critical is the low engagement in continuous education and training, which could undermine the workforce's ability to adapt to bioeconomy-related technological and process changes. Youth labor market integration remains weak, risking the loss of generational renewal in key sectors. In governance, while the quality of national regulation is relatively strong, persistent challenges exist in administrative efficiency, financial incentives for innovation, and adapting rules to support waste valorization as well as other bio-based processes.

Opportunities

Strong forestry and agricultural industries, a diverse manufacturing sector, and a high concentration of academic institutions present clear opportunities for innovation and supply chain growth. The advanced level of education in Podkarpackie provides a solid foundation for specialized training and further education in the field of bioeconomy. Targeted training programs aimed at activating the region's young workforce can further enhance human capital and strengthen the regional innovation ecosystem. In addition, inclusive policymaking and participatory governance models can help build social legitimacy and public acceptance of bio-based innovations. Strengthening collaborations between universities, research institutions, and start-ups will reinforce regional innovation networks, foster knowledge exchange, and accelerate technology transfer. The region's forward-looking capacity to address bioeconomy risks and realign policy measures further enhances the resilience of the governance framework, indicating that bioeconomy development is understood not merely as an economic growth strategy but as a balanced and sustainable pathway for transformation.

Threats

Although corruption is not perceived to be widespread, concerns remain about the influence of elites or private interests on political decisions and about the ability of the media and civil society to investigate corruption freely. Such perceptions could weaken transparency and accountability mechanisms that are crucial for fair competition in emerging bio-based markets. At the same time, the dominance of traditional industries may crowd out innovation incentives, limiting the development of new bio-based value chains. Weak administrative capacities, including bureaucratic inefficiencies and limited institutional independence, can pose barriers to effectively accessing and implementing EU funding. Legal uncertainty and doubts regarding judicial independence and regulatory stability may further discourage private investment and international cooperation. Demographic challenges, including the outmigration of young talent and the underrepresentation of women in key sectors, risk undermining the region's long-term innovation potential. Together, these factors may weaken governance structures and slow down the systemic transformation required for a sustainable bioeconomy.

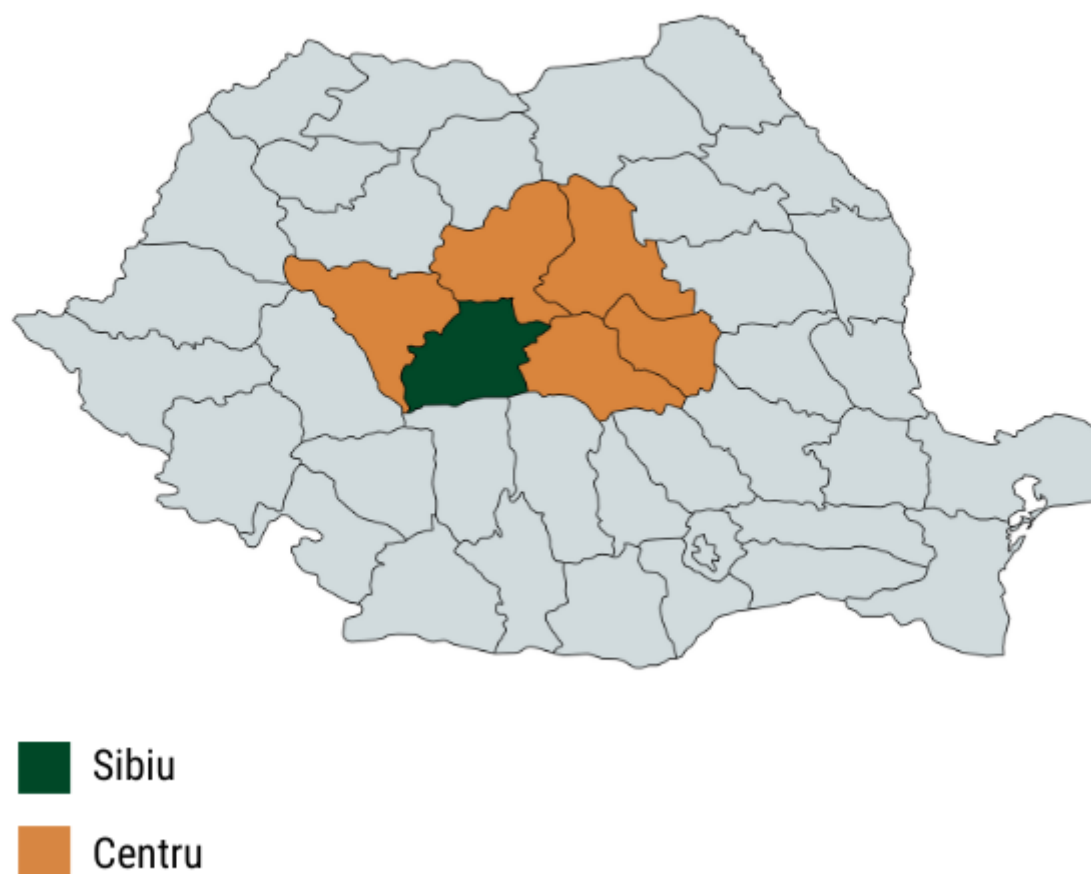
Potential areas of action for improving governance performance in Podkarpackie

In order for Podkarpackie to fully realize its bioeconomic potential, greater emphasis may need to be placed on improving the inclusiveness, transparency, and professionalism of governance. Enhancing opportunities for citizen participation, strengthening the independence of the media and institutions, and ensuring regulatory predictability are essential steps toward building trust. Addressing these governance challenges can not only contribute to more effective policy implementation but also promote the social legitimacy and investor confidence needed for a sustainable transformation of the economy in Podkarpackie. Furthermore, to reap the benefits of educational attainment, effective policy

measures are needed to bridge the gap between formal education and continuous skills development, thereby promoting innovation and adaptability.

4.7 Sibiu, Romania

Figure 13: Map of counties in Romania.



Created with MapChart

Based on the RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), Sibiu is advancing its regional transformation toward a circular bioeconomy by aligning environmental priorities with the "One Planet – One Health" framework and fostering synergies between environmental health, sustainable food systems, and rural revitalization. This transformation is driven by integrating biotechnological innovations across agriculture, food processing, and waste valorization, including the development of organic fertilizers and local biorefineries. However, the region faces specific challenges, such as fragmented stakeholder coordination, limited understanding and access to advanced bio-based technologies, and a lack of cohesive infrastructure to support circular practices. While policy initiatives, such as the Romanian Strategy for the Circular Economy and European sustainability partnerships, provide a broader framework, Sibiu's success depends on empowering local actors, universities, and public institutions to co-create and implement solutions that reflect the region's unique economic and ecological contexts. Thus, at the County level, there is a gap between the objectives of the national strategy and the needs for local governance, further underlying the need for capacity building support.

4.7.1 Socio-Economic Profile

It is important to note that, due to limited data availability at the NUTS-3 level (Sibiu), most of the data presented here pertains to the wider NUTS-2 region Centru, which includes Sibiu. Furthermore, while the focus of the RIBES project is on the bioeconomy, official statistics do not isolate bioeconomy-

specific data across all indicators. As a result, the figures reported here refer to the overall economy unless otherwise specified.

Sibiu (highlighted in dark green in [Fig. 13](#)) is one of 42 counties in Romania and part of the Centru region (highlighted in yellow in [Fig. 13](#)) located in the center of the country. In 2024, the population of Sibiu County was 393,581. With a population density of 72.6 inhabitants¹³ per km², Sibiu is around the national average. However, Sibiu is an essential contributor to the Romanian economy. Compared to other regions, this county has a GDP of €6,678.47 million at current market prices¹⁴¹⁵. With a GDP per capita of €17,000, Sibiu is in the top quarter of all counties in Romania and is on par with the national average. This underscores the economic strength of the district and its overall significance in the national context. Additionally, this economic power becomes clearer when comparing it to the entire Centru region. While Sibiu shows above-average economic indicators, the Centru region ranks mid-range compared to other Romanian regions (Eurostat, 2025).

The economic performance of the Centru region, and Sibiu in particular, positions the area within a moderate range compared to other regions. In 2022, the net turnover from innovative enterprises in Centru reached €13.16 billion, positioning it in the middle among other regions in Romania (Romania total: €136.16 billion). This reflects a strong innovation foundation, capable of supporting bioeconomic growth if paired with suitable institutional frameworks. The moderate innovation turnover suggests there may be potential for innovation-driven bioeconomic growth, provided it is supported by governance structures and aligned with strategic societal goals. The inclusion of the Centru region into the EC Regional Innovation Valleys Initiative is another sign that the regional potential is being appreciated (*Regional Innovation Valleys*, 2025)

GVA in bioeconomy sectors in the Centru region reached €173 million in 2023 for NACE A (agriculture, forestry, and fishing) and €1,461 million in 2022 for NACE C (manufacturing). However, these figures should be interpreted cautiously. NACE A is entirely attributable to the bioeconomy, whereas NACE C is a hybrid sector comprising both bio-based and non-bio-based activities, so it only partially reflects bioeconomy-related value creation. Additionally, data for other bioeconomy sectors are currently unavailable or cannot be broken down further. This reveals the limitations of existing statistics (Eurostat, 2025).

Employment in NACE A sectors was 71,600 in 2024, the second lowest among Romanian regions. In contrast, employment in NACE sectors B–E (industry excluding construction) totaled 277,800 in 2023, the third highest in Romania. However, NACE C and D are only partially related to the bioeconomy. The small employment base in NACE A, coupled with low GVA, suggests it is not a major contributor to Sibiu's economy. Since the dataset cannot be further broken down, these figures should be interpreted carefully (Eurostat, 2025).

While the overall unemployment rate¹³ in Centru was relatively low at 4.3% (2024), outperforming the national average of 5.4% and the EU-27 average of 5.9%, a closer look reveals some structural issues. The long-term unemployment rate was 2.3%, higher than Romania's national average of 1.8% and the EU-27's 1.9%, indicating persistent barriers to workforce reintegration. Similarly, labor market slack stood at 7.7%, signaling untapped potential and underemployment, though still lower than the EU-27 average of 11.7%. Notably, the employment rate for 15–74-year-olds in Centru is low at 53% (2024), well below the EU-27 average of 61.7%. The 15-24 age group is also severely affected by the situation, with 22% neither in employment nor in education or training (NEET), which is significantly above the Romanian average of 17% and the EU average of 9.2%. In addition, the school leaving rate in Centru is

high at 21.6% among 18- to 24-year-olds. Additionally, gender disparities influence employment dynamics in Centru. The gender employment gap at the NUTS 2 level in Romania was 27.1% (2023) for ages 20–64, one of the highest in the EU. Within Centru, women’s unemployment was 3.1%, below the national and EU averages, while men’s unemployment was higher at 5.2%. However, employment rates among men (61.2%) are significantly higher than among women (53%) in Centru. NEET rates for women (15–24 years) are alarmingly high at 27.4%, compared to 9.2% for men in the same age group. Early school leaving among young women is 22.7%, vs. 20.5% for young men, far above the EU-27 average of 7.7%. These gender inequalities can impact regional governance, particularly in terms of inclusivity, stakeholder engagement, and fair decision-making in the bioeconomy transition. Gender inclusion should therefore be integrated into the design and execution of regional bioeconomy strategies (Eurostat, 2025).

The level of education and participation in lifelong learning pose challenges in the region. While unemployment among those with upper secondary or post-secondary non-tertiary education is relatively low at 2.7% in Centru, individuals with lower education levels face a much higher rate of 19.2%, well above national and EU averages. Participation in education and training over the four weeks (for ages 25–64) remains low at 5.6%, compared to 8.9% in Romania and 13.5% in the EU (Eurostat, 2025).

Considering differences between age groups, 15- to 24-year-olds in Centru have a low employment rate of 19.5% (EU-27: 34.9%) and an economic activity rate of 24.3% in 2024, while the 25-34 age group has a higher activity rate of 73.1%, which is still below the national average of 79.4% (Eurostat, 2025).

The average household income (measured as net primary income per capita) in the Centru region was €7,900 in 2024, slightly below Romania’s average of €8,000 and well below the EU-27 average of €22,700. The income quintile share ratio (S80/S20) is 4.2 in Centru (Romania: 4.6), indicating slightly lower income inequality than at the national level (Eurostat, 2025).

4.7.2 Self-assessment of Existing Governance Practices

The governance self-assessment for the Sibiu region shows a mixed picture, with both strengths and areas needing significant improvement. Governance practices, according to the *Voice and Accountability* indicator, are somewhat developed in Sibiu. Citizen engagement and transparency are rated as neutral, reflecting the existence of basic participatory mechanisms such as co-design in policymaking and platforms for political dialogue. However, it is assessed that there is a lack of effective mechanisms for monitoring implementation. Freedom of expression is generally protected. Regional media are relatively independent, and citizens can openly share their opinions, according to the respondents.

The region also shows moderate performance according to the *Regulatory Quality* indicator. Citizens can relatively easily start businesses, and the market is largely free from government control over prices and wages. However, there are clear administrative and political barriers to market entry, and businesses lack confidence in long-term regulatory stability. Instruments to monitor *Regulatory Quality* are mostly missing, especially regarding financial sector oversight and rule predictability.

In terms of *Government Effectiveness*, respondents assess public services like education, healthcare, and transport as generally accessible, but they do not cover all needs in Sibiu. Furthermore, the processes that regulate them are unclear, and there is a lack of measurable indicators for performance evaluation. While public administration is viewed as independent and professional, there are no long-

term strategies in place for policy planning. Political measures and budget allocations are assessed as inconsistently executed, and systems for monitoring investment efficiency are not yet established. Although budget transparency is generally recognized, the lack of mechanisms to ensure that financial commitments are honored remains a concern.

The *Rule of Law* in Sibiu is a particular concern. Judicial independence is rated very poorly, mainly because of the absence of clear and transparent indicators that could build trust among citizens and businesses. While contracts and property rights are formally protected, enforcement is seen as inconsistent, especially in infrastructure-related issues. Law enforcement enjoys a relatively high level of trust, but mechanisms for tracking public confidence are lacking. Legal stability and predictability are rated poorly, highlighting the absence of a long-term legislative vision, which weakens trust in the legal system.

The effectiveness of the *Control of Corruption* measures also remains a challenge. Corruption is perceived as widespread and significantly affects access to public services and fair competition. Although there are legal frameworks to prevent corruption, their implementation lacks measurable indicators. Public officials are considered to operate ethically, but accountability mechanisms are underdeveloped. Political decision-making is seen as heavily influenced by elites and private interests. Media and civil society actors can report corruption, but protections for whistleblowers and follow-up investigations are insufficiently supported by tracking indicators.

Regarding the *Governance of Bioeconomy Risks*, Sibiu's regional strategy recognizes potential socio-economic and environmental trade-offs, such as biodiversity loss or increased inequality. However, concrete political actions to reduce these risks are still under development. Monitoring and adaptability mechanisms are notably lacking, especially with evolving challenges like the impact of the Ukraine-Russia war on the region. These events have heavily affected agriculture in Romania's border areas, yet adaptive governance responses are absent.

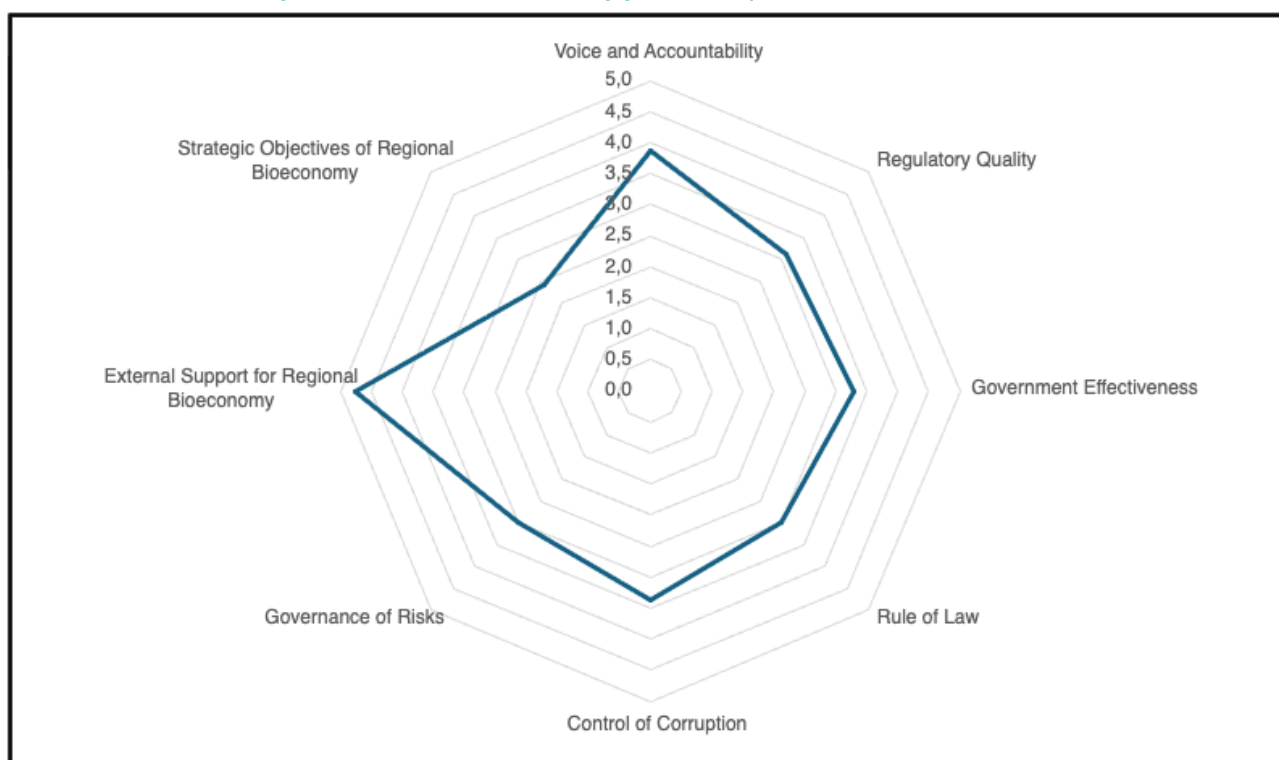
Finally, the region performs more positively in *External Support for the Bioeconomy*. Citizens and businesses are aware of EU and international funding opportunities, and the alignment of external support with regional priorities is rated highly. Nonetheless, access remains difficult, as bureaucratic complexities and complicated procedures discourage potential applicants. While overall external support has a positive impact, there is a strong need for innovative mechanisms to boost participation, especially among groups currently underrepresented in accessing EU funds.

Regarding *Strategic Objectives for the Regional Bioeconomy* in Sibiu, the framework is currently influenced by the national bioeconomy strategy and the County Sustainable Development Strategy, both of which address regional needs. Although a regional strategy exists, it lacks detailed, measurable indicators and mechanisms for evaluation and adaptation. Further development of efficiency indicators and cost-monitoring systems is necessary, as the bioeconomy value chains have not yet been systematically surveyed. The implementation of strategic objectives remains limited. Citizens and businesses do not perceive decisive actions as actively occurring through visible measures. Better communication tools and participatory methods are needed to foster understanding and engagement in the bioeconomy process. Awareness of specific political, financial, or regulatory efforts is low, even though businesses recognize the potential benefits of circular bioeconomy practices. Involvement of industries, research institutions, and civil society remains minimal, with efforts only in early stages. Policy integration is weak, as the regional bioeconomy strategy is not well aligned with other policy areas such as climate, agriculture, or industry, and lacks precise mechanisms for adaptability or

monitoring. As a result, tangible results and regional impacts are limited. There is no County Platform for Bioeconomy in place, and long-term partnerships among research institutions and businesses have yet to be established. Consequently, citizens and businesses have not yet launched innovative projects or pilot initiatives under the regional bioeconomy strategy.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Strategic Objectives of Regional Bioeconomy*, *Regulatory Quality*, *Government Effectiveness*, *Rule of Law*, *Control of Corruption*, and *Governance of Risks* (Fig. 14).

Figure 14: Assessment of existing governance practices in Sibiu, Romania.



4.7.3 SWOT Analysis of Existing Governance Practices

The results of the governance and socioeconomic analysis of Sibiu are classified into strengths, weaknesses, opportunities, and threats in order to identify opportunities for action.

Strengths

In Sibiu, strengths include the relative independence of the media, legal protection of citizen participation rights, and growing awareness of EU funding opportunities for bioeconomy-related projects. Freedom of expression can be an important prerequisite for transparent debate on sustainability policy. Local administration is perceived as independent and professional, providing a governance foundation for implementing circular bioeconomy initiatives if institutional capacities are strengthened. Citizens and businesses are aware of EU and international funding opportunities, and external support is largely consistent with regional priorities, creating a strong enabling environment for future projects. The existence of a national circular economy strategy and European sustainability partnerships further support policy alignment at the regional level and can therefore promote policy coherence and access to external support mechanisms.

On a socioeconomic level, Sibiu shows an economically favorable position, which is reflected in a high GDP compared to the national average, potentially supporting investments in the bioeconomy in the region. The moderate turnover and inclusion in the *Regional Innovation Valleys* Initiative also reflect existing innovation potential that can be mobilized for bio-based growth.

Weaknesses

The region's strengths are offset by considerable weaknesses. A major weakness is the fragmented coordination among stakeholders that can limit coherent bioeconomy governance and the scaling of innovations. While participatory mechanisms exist in theory, their implementation remains superficial, restricting meaningful citizen involvement and transparency in policy processes. Regulatory quality is weakened by inconsistent enforcement and a lack of monitoring mechanisms, which hampers trust and long-term investment security. Furthermore, government effectiveness is hampered by unclear procedures, inconsistent budget implementation, and limited strategic depth. The rule of law remains a concern, mainly due to perceived judicial inefficiency and low legal predictability that can weaken confidence among investors or citizens. Corruption continues to diminish public trust, and accountability structures are underdeveloped. These governance issues could decrease the region's capacity to support innovation, manage socio-environmental risks, and provide inclusive access to bioeconomic opportunities. Notably, the regional bioeconomy strategy lacks clear indicators, monitoring tools, and alignment with other policy areas such as climate, industry, or rural development, preventing accountability and evidence-based policymaking. Although businesses recognize the potential of bioeconomy solutions, the absence of clear implementation measures and communication tools hinders broader stakeholder engagement. Financial instruments, legal frameworks, and technology transfer mechanisms are also insufficiently tailored to the needs of small-scale enterprises, further slowing the transformation process. Moreover, Sibiu lacks mechanisms to monitor and respond to external shocks (e.g., the Ukraine–Russia war), limiting resilience of agriculture and rural sectors.

At the socioeconomic level, weaknesses can be identified in the areas of education and the labor market. Low participation in lifelong learning, a high NEET rate, and early school leaving indicate a skills

gap in the working-age population, which reduces the readiness for bio-based industries in Sibiu. In addition, the youngest age group has significantly lower employment and economic activity rates. These patterns suggest that young people in Sibiu face structural barriers to entering the labor market and that brain drain or outmigration may weaken local human capital vital for governance renewal and transformation. In addition, gender inequalities can be observed in all age groups, hindering inclusive economic participation and the social legitimacy of bioeconomic transitions. The low absolute income levels, although income distribution appears somewhat more equitable than in other parts of Romania, may weaken economic resilience and willingness to engage in risky innovation processes. Addressing these vulnerabilities with inclusive bioeconomic policies can strengthen public support for regional transformation.

Opportunities

Sibiu has started aligning its development goals with the "One Health" concept, emphasizing environmental health, food security, and rural revitalization. A strong policy alignment with EU strategies and awareness of funding can be leveraged to finance innovation, infrastructure, and capacity building in the bioeconomy. Also, participation in EU initiatives (e.g., *Regional Innovation Valleys*) offers opportunities for knowledge sharing and replication of good practices across borders. Sibiu also shows a promising foundation for advancing its transition toward a CBE as the region is incorporating biotechnological innovations across agriculture, food processing, and waste valorization, with increasing interest in organic fertilizers and local biorefineries. These early efforts demonstrate strong potential and initial momentum in adopting bioeconomy principles.

Sibiu's relatively strong economic position, reflected in above-average GDP levels and solid innovation capacities, provides a solid base for integrating bio-based economic activities. The relatively high employment in NACE B–E indicates a potential labor reservoir that, with proper reskilling and mobilization, could support industrial bioeconomic sectors. Moreover, Sibiu benefits from an engaged academic sector and a developing network of local agricultural enterprises, both of which can become vital players in advancing the regional bioeconomy.

Threats

A significant concern is the persistent corruption and political capture in Sibiu. The continued perception of elite influence in decision-making can undermine the legitimacy of governance reforms and discourage private sector engagement.

Potential areas of action for improving governance performance in Sibiu

While Sibiu has economic potential and emerging strategic initiatives aligned with circular bioeconomy principles, its governance framework currently lacks the coherence, adaptability, and participatory depth needed to drive systemic transformation. Addressing these weaknesses through targeted institutional reforms, stronger cross-sectoral integration, and localized implementation mechanisms will be essential to unlocking the region's full bioeconomic potential.

Further region-tailored governance practices to be developed may include cross-sectoral collaboration mechanisms, adaptive legal frameworks, targeted technology transfer programs, and financial instruments designed to support small-scale agricultural enterprises.

4.8 Vojvodina, Serbia

Figure 15: Map of NUTS 2 subdivisions in Serbia.



Created with MapChart

As outlined in RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), Vojvodina, with its strong agricultural base, is positioning itself as a key player in the shift toward CBE focused on sustainable rural growth. The region emphasizes participatory decision-making and social innovation to actively engage stakeholders in tackling ongoing socio-economic disparities, especially in underdeveloped rural areas. Its bioeconomy strategy centers on biomass use, sustainable farming methods, and the production of healthy food, biofuels, and organic fertilizers, with a particular focus on valorizing agricultural byproducts and integrating marginalized rural populations into sustainable value chains. However, Vojvodina faces specific regional challenges, including limited financial initiatives, low public awareness of bioeconomy opportunities, and weak coordination among key players.

4.8.1 Socio-Economic Profile

Vojvodina is one of the five autonomous provinces in Serbia. It is part of the Pannonian Basin located in the northernmost part of Serbia (bordered by Croatia to the west, Hungary to the north, and Romania to the east). It is a typical agricultural region, with a total area of 21,506 km² (agricultural arable land comprising 80.39%, forests making up 10.87%), and a population of 1,729,606 in 2024. Its GDP at current market prices is €18,483.14 million. With a second-largest GDP of €10,700 per inhabitant, the

economic development of the region is relatively high compared to other Serbian regions¹⁷ (Eurostat, 2025).

In terms of the regional bioeconomy in Vojvodina, agricultural by-products and energy crops are utilized for energy generation (biogas). However, green urban waste is only partly composted, several sewage sludge plants are in operation, and the most significant unused potential is agricultural biomass (straw). Critical environmental risks include deteriorating air quality (due to energy from fossil fuels) and water/soil pollution (from improper municipal and industrial waste disposal, etc.). There is agricultural poverty (insufficient government support) and a significant brain drain since the 1990s, leading to rural area abandonment, with a constant decline in education quality. Vojvodina exhibits a diverse socio-economic profile with significant implications for its transition to a bioeconomy. Although specific data on net turnover for innovative enterprises and household income at the Eurostat level are unavailable, insights into the region's economic activity can be gained from other indicators. In 2023, the GVA from NACE A reached €1,268.34 million, indicating the sector's full integration into the bioeconomy. Additionally, NACE C contributed €3,715.2 million, though this figure includes only partial bioeconomic activities, so caution is needed in interpretation. Regional GVA data for NACE D is absent. Vojvodina also shows strong employment numbers, with 91,800 people working in agriculture, making it a national leader in this sector in Serbia. Industrial employment (NACE B-E), excluding construction, involves 200,400 workers (Eurostat, 2025).

Nonetheless, overall Vojvodina employment rates at 56.7% remain slightly below the EU average of 61.7%, although they are nearly aligned with Serbia's national rate. Unemployment challenges in the region persist, with a total unemployment rate of 8.4%, which is slightly higher than the EU's 5.9% but below the national average. Long-term unemployment stands at 2.6%. Men's and women's employment rates at 63.5% and 50%, respectively, highlight a gender gap in the region. Unemployment among women slightly exceeds that of men (Eurostat, 2025).

Men's and women's employment rates at 63.5% and 50%, respectively, highlight a gender gap reflective of broader national trends. Unemployment among women slightly exceeds that of men, illustrating systemic barriers that require targeted governance frameworks emphasizing gender inclusivity (Eurostat, 2025).

Despite strong attainment rates in secondary and post-secondary education, the ongoing education and training rate is low, indicating a need for strategic development in the region. This gap suggests a requirement to align educational opportunities with labor market needs, particularly in bioeconomy sectors that demand continuous skill upgrades (Eurostat, 2025).

Education remains both a strength and a challenge in Vojvodina. While there is strong attainment in secondary and post-secondary education, participation in ongoing education and training is relatively low at 5.9%. Age demographics also present a complex picture. Economic activity rates are healthy, especially among young adults aged 25-34 at 87%, yet employment rates for younger people aged 15-24 lag behind EU standards, at just 27.7%. Addressing this gap calls for initiatives focused on integrating young talent into the workforce, especially within emerging bio-based sectors. Although specific household income data is lacking, the region's income distribution will be crucial for understanding economic equity in bioeconomic progress. In the absence of detailed data, the income

quintile shares ratio remains unknown, but the broader socio-economic fabric suggests areas where governance can play a transformative role (Eurostat, 2025).

4.8.2 Self-assessment of Existing Governance Practices

The self-assessment of governance practices in Vojvodina provides a rather critical impression, with structural weaknesses in most areas of governance. *Voice and Accountability* is evaluated negatively overall. Citizens are seen as having limited influence on political decision-making, and there are few established platforms for dialogue with regulated feedback mechanisms. Transparency of regional political decisions received a neutral rating, indicating some availability of information but not in a systematic or user-friendly way. Participation rights were assessed critically, with doubts about equal and fair access for all groups. Freedom of expression was rated neutrally regarding the media landscape, but negatively regarding citizens' ability to express opinions publicly without fear of repression, signaling a trust gap between institutions and the population.

Regulatory Quality also received low scores. While starting and running a business was considered relatively easy, broader issues with market entry, regulatory stability, and predictability were identified. Respondents disagreed that businesses could rely on consistent long-term rules, pointing to political fluctuations and frequent regulatory changes as a barrier to planning. Government interventions in markets, such as subsidies or price regulations, were viewed as distorting rather than stabilizing, while financial sector regulation was judged neutrally, suggesting neither outright failure nor strong confidence in oversight mechanisms.

In terms of *Government Effectiveness*, responses highlighted uneven performance. MTFs generally agreed that access to basic services like education and healthcare is ensured, though service quality is perceived as inconsistent. Administrative processes were rated as inefficient and prone to political influence. Strategic policy formulation and adaptability to new challenges were mostly neutral, suggesting some frameworks exist but are weakly implemented. The most critical ratings were reserved for budget and financial management, where respondents strongly disagreed that citizens are aware of budget allocation or that investments in key sectors are planned and delivered efficiently.

The *Rule of Law* dimension revealed low institutional trust. Judicial independence was rated negatively, reflecting concerns about political influence and transparency. While contracts are generally enforceable, property rights and protection against state intervention received weak confidence. Trust in law enforcement is low, and the predictability of the legal system was perceived as neutral. Together, these results underline a fragile legal environment that could limit both business confidence and citizen trust.

Control of Corruption was identified as a major challenge. Corruption was perceived as widespread, affecting access to public services and distorting competition. While ethical standards for public officials exist formally, enforcement and accountability were considered insufficient. Media and civil society oversight were rated neutrally, with whistleblower protection explicitly assessed as weak. These findings point to systemic corruption risks undermining fair governance and market conditions.

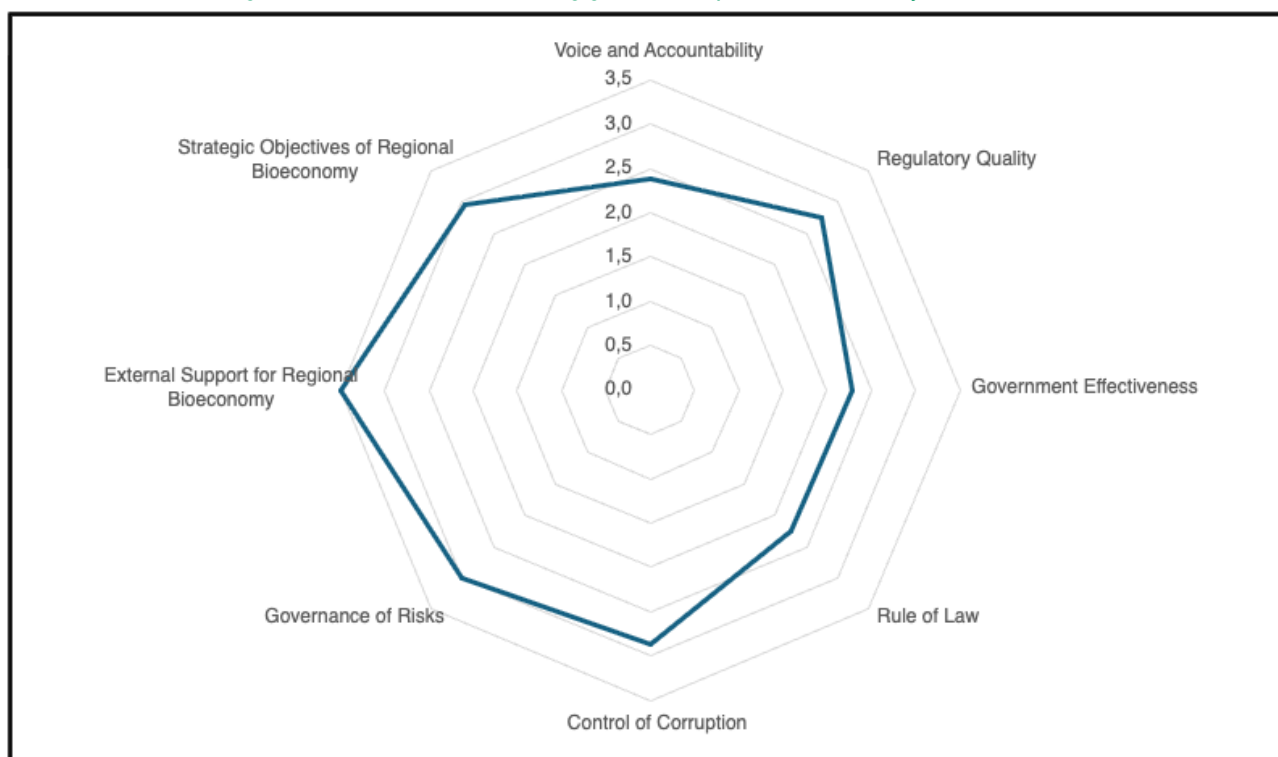
Turning to the bioeconomy-related indicators, *Governance of Risks* received uniformly neutral evaluations, with respondents noting that Serbia's bioeconomy framework is still in its infancy. Trade-offs, mitigation measures, and adaptive mechanisms are not yet systematically addressed, though developments are underway.

By contrast, *External Support for Regional Bioeconomy* was rated more positively. Respondents agreed that EU and international support measures are accessible and contribute to awareness and capacity building. However, the structuring, targeting, and tangible impact of such measures were seen as limited, with many still in early development stages. Long-term sustainability and continuity of external support were evaluated positively, especially in terms of ongoing partnerships and capacity-building.

The *Strategic Objectives of Regional Bioeconomy* highlight the most significant governance gap. Respondents disagreed that a clear and comprehensive strategy exists, noting that only a bioeconomy roadmap is currently being developed. As a result, measurable indicators, evaluation mechanisms, and visible implementation are largely absent. Awareness of political or financial support measures is low, and tangible results are not yet visible. Nonetheless, the involvement of universities, industry, and civil society in the roadmap's development was seen positively, as was the integration of bioeconomy themes with related policy areas such as agriculture and climate.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Voice and Accountability*, *Government Effectiveness*, *Rule of Law*, and *Governance of Risks* (Fig. 16).

Figure 16: Assessment of existing governance practices in the Vojvodina, Serbia.



4.8.3 SWOT Analysis of Existing Governance Practices

The analysis and self-assessment of Vojvodina yield multiple implications for the governance framework critical to transforming into a circular bioeconomy effectively.

Strengths

The strengths of Vojvodina include a strong agricultural base, which provides a stable foundation for bio-based value chains and biomass utilization. The already established use of agricultural by-products is showing the first signs of a functioning circular bioeconomy. The high proportion of employment in the primary and industrial sectors represents a broad labor base in sectors directly relevant to the bioeconomy and facilitates the development of regional value chains. In addition, the region has a relatively high economic performance, indicating solid economic structures that enable investment in the bioeconomy. The positive perception of external support measures for the regional bioeconomy in Vojvodina can strengthen regional capacities through external partnerships. The involvement and participation of universities, business, and civil society in the development of a bioeconomy roadmap lay the foundation for multi-stakeholder governance models.

Weaknesses

Vojvodina's self-assessment reveals a government environment characterized by weak accountability, low trust in institutions, and widespread perceptions of corruption, but also by relatively better access to basic services and initial steps toward bioeconomic development. This points to low transparency, weak participatory rights, and limited rule of law. Perceived corruption undermines trust in institutions, hinders fair market conditions, and reduces security for investors. The lack of trust in the rule of law, weak judicial independence, and unclear property rights reduce planning security and willingness to invest. In addition, the lack of regional financing mechanisms and poor coordination between key stakeholders can hamper innovation dynamics in the region. The lack of a comprehensive bioeconomy strategy and effective risk management regarding the bioeconomy limits the transformation potential in Vojvodina and weakens the ability to manage this transformation towards a bioeconomy. The long-term unemployment rate suggests ongoing structural issues despite being lower than the national average. Also, the insufficient connection between education and the labor market weakens labor market integration in future-oriented bioeconomy sectors.

Opportunities

Among the opportunities in the region is access to EU funding and international partnerships, which can be used to expand capacities, overcome innovation barriers, and build infrastructure. Additionally, the strong agricultural resource base allows for diversification into bioenergy, biofuels, bioproducts, and sustainable fertilizers. Furthermore, potential arising from the high industrial employment reflecting Vojvodina's resilient industrial base can be harnessed to strengthen the workforce for the bioeconomy through investments in lifelong learning and vocational training.

Threats

The ongoing political instability and corruption represent one of the threats to the transformation towards a bioeconomy in Vojvodina. Political interference endangers the long-term implementation of strategies and undermines stakeholder trust. Moreover, legal uncertainties, lack of judicial independence, and absence of stable framework conditions can increase investment risks for

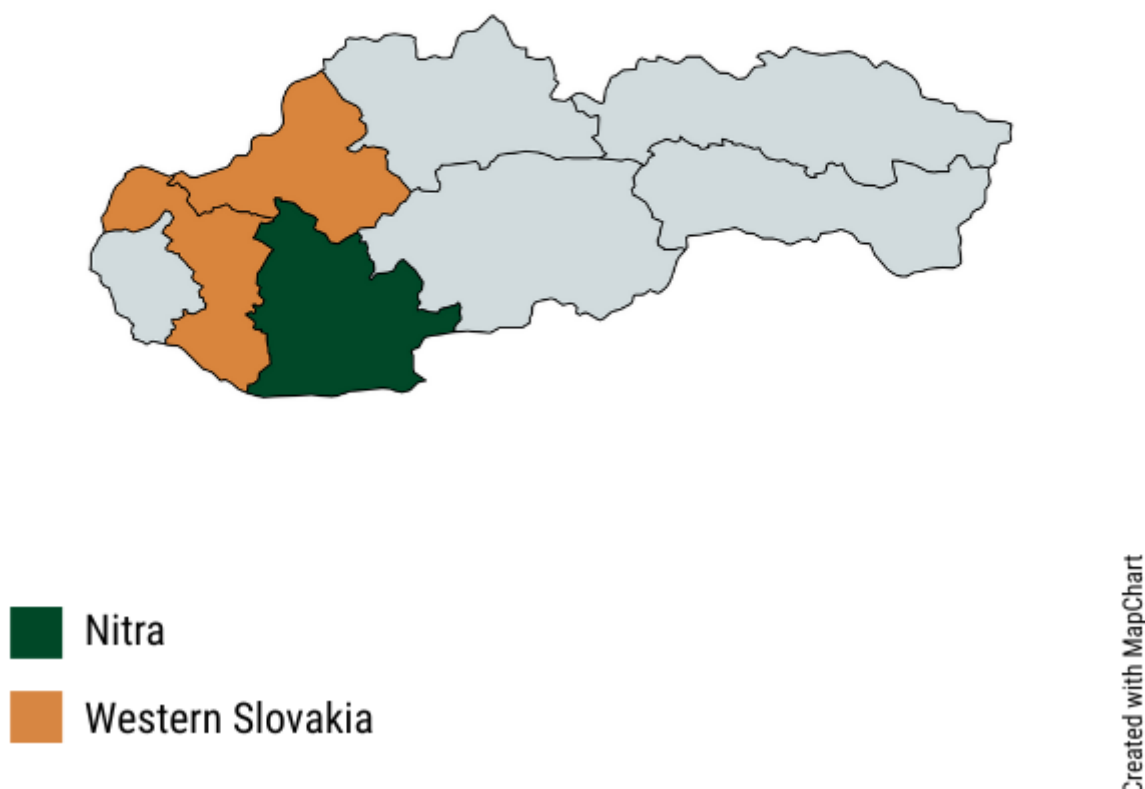
investments in the region's bioeconomic transformation. The lack of governance mechanisms to manage risks associated with the bioeconomy can also make the region vulnerable. On a socio-economic level, the entrenchment of social inequalities through gender inequality and low youth integration into the labor market can lead to untapped innovation potential in bioeconomic sectors.

Potential areas of action for improving governance performance in Vojvodina

To strengthen governance performance in Vojvodina, action should focus on improving institutional accountability, transparency, and regulatory stability. Addressing corruption and strengthening the rule of law are essential to build trust among stakeholders and create a predictable environment for bioeconomy investments. Clearer strategic frameworks and comprehensive risk management mechanisms are needed to effectively guide the transition toward a circular bioeconomy. Strengthening coordination among key actors and establishing dedicated financing instruments can enhance innovation capacity. Furthermore, better alignment between education and labor market needs, including targeted training programs, can mobilize the region's strong agricultural and industrial base. Leveraging external EU support and partnerships can accelerate these governance improvements and ensure that opportunities for sustainable growth are fully realized.

4.9 Nitra, Slovakia

Figure 17: Map of NUTS 3 subdivisions in Slovakia.



As reported in RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), Nitra region, known for its strong agricultural roots, is undergoing a strategic change by adopting digitalization and bioeconomy principles to support more sustainable and resilient farming systems. This shift focuses on blending traditional farming knowledge with advanced technologies, including precision agriculture, vertical and indoor farming, and smart farming solutions. Social innovation also plays a key role, emphasizing the inclusion of marginalized groups in labor-intensive roles and promoting entrepreneurship among young farmers. In Slovakia, new bio-based value chains are developing around high-value crops like saffron, biochar production from biowaste, organic fertilizers, and converting food processing residues into animal feed.

The Nitra region, located within Western Slovakia, offers a promising yet complex environment for developing the circular bioeconomy, supported by its strong agricultural sector and growing industrial base. The region's well-established agri-food infrastructure, backed by institutions such as the Slovak University of Agriculture and the National Agriculture and Food Centre, provides a vital foundation for incorporating bioeconomy principles and digital innovations. This ongoing transformation combines traditional farming skills with emerging technologies like precision and smart farming, encouraging the development of new bio-based value chains such as high-value crops, biochar production, organic fertilizers, and the reuse of food processing residues. These initiatives demonstrate the region's potential to foster sustainable and resilient bioeconomic growth that aligns with broader EU Green Deal objectives (Müller et al., 2025; Wintjes et al., 2025).

4.9.1 Socio-Economic Profile

The highly industrialized and agriculturally dominated region of Nitra (highlighted in dark green in [Fig. 17](#)) is an administrative area covering 6,344 km², with a population of 668,301 in 2024, located in southwestern Slovakia as part of the Western Slovakia region (highlighted in yellow in [Fig. 17](#)). It has a GDP at current market prices of €13,491.83 million and a GDP per capita of €20,000, which is not far from the country's average of €22,500 in 2023. Nitra has a strong network in the field of agriculture, including the University of Agriculture, the National Agriculture and Food Centre, and other institutes and stakeholders that focus on agri-food infrastructure, capacities, and knowledge (Eurostat, 2025).

Notable economic activities and vibrant social dynamics drive the transformation toward a bioeconomy in the Nitra region. It is important to note that, due to limited data availability at the NUTS-3 level (Nitra), most of the data presented here refers to the broader NUTS-2 region of Western Slovakia, which includes Nitra. In 2022, the region's innovative enterprises generated a significant net turnover of 19.8 billion EUR, positioning Western Slovakia as the second-highest performing region in terms of turnover within the country. Regarding bioeconomic output, the GVA for 2023 in Nitra showed contributions of 494.77 million euros from NACE A and 3,264.15 million euros from NACE C. It's important to recognize that only NACE A fully aligns with bioeconomy sectors, while NACE C and D are partially included, so caution is needed when interpreting these figures. Regional GVA data for NACE D are not available. Employment trends further bolster the region's bioeconomy potential. By 2024, Western Slovakia is expected to lead in employment within NACE A, with 20.8 thousand people, and NACE B-E, with 278.7 thousand people engaged. The regional employment rate for individuals aged 15-74 is projected at 63.6%, surpassing both the national Slovak average of 63.1% and the EU27 average of 61.7% (Eurostat, 2025).

Furthermore, with an unemployment rate of just 3.3%, Western Slovakia demonstrates notable resilience compared to Slovakia's 5.3% and the EU27's 5.9%. Long-term unemployment remains low at 1.8%, emphasizing a stable labor market in contrast to Slovakia's 3.5% and the EU27's 1.9%. On the gender front, regional employment disparities are minimal, with a gap of only 6.3%, well below the EU27 average of 11.5%. Men's unemployment is at 2.9%, and women's unemployment is at 3.8%, both figures more favorable than national and EU averages (Eurostat, 2025).

Educational attainment and participation rates also play a major role in the region's socio-economic fabric. In 2024, participation in education and training among people aged 25-64 stands at 11.7%, closely matching the EU27 average. A significant 70.5% of the population in this age group has achieved secondary or post-secondary non-tertiary education, highlighting the region's dedication to educational growth. Regarding demographic engagement, the economic activity rate in 2024 for ages 15-74 is 65.7%. Employment among young people (15-24 years) is at 23.1%, while 79.4% of those aged 20-64 are employed, surpassing the EU27 average, indicating strong labor market participation across age groups (Eurostat, 2025).

Despite these advantages, the region's annual income per person is €11,700, which is lower than Slovakia's average of €12,600 and the EU27's €22,700. However, the income quintile shares ratio (S80/S20) at 2.8 reflects relatively fair income distribution compared to national averages. Overall, the socio-economic landscape, supported by comprehensive governance frameworks, positions Western Slovakia as an important player in the national transition to CBE. This region leverages high turnover,

substantial employment, and educational achievements to promote sustainable development in line with the EU goals (Eurostat, 2025).

4.9.2 Self-assessment of Existing Governance Practices

While the self-assessment in the Nitra region was formally intended to provide a regional perspective, the responses provided by the project partners were framed predominantly at the national level of Slovakia. This methodological divergence needs to be interpreted carefully. Although it limits the ability to capture region-specific governance dynamics, it nonetheless offers valuable insights into the broader institutional and governance environment in which Nitra is embedded. Given that national frameworks often strongly shape regional implementation capacity, the results can still be considered indicative of the enabling conditions and constraints for the bioeconomy transition in the region.

The assessment points to notable weaknesses in *Voice and Accountability*. Citizen engagement in decision-making is reported as limited, with low levels of participatory mechanisms such as forums or workshops and a lack of comprehensive transparency in political communication. While freedom of expression is largely guaranteed, equal participation rights remain unevenly secured, and the absence of structured feedback loops diminishes the legitimacy of governance processes.

In terms of *Regulatory Quality*, the Slovak context appears to provide relatively open market access, with citizens and businesses perceiving few formal administrative barriers to entry. State intervention in markets is perceived as more distortive than stabilizing, and the supervision of the financial sector is not universally trusted to be free from political manipulation. The indicator of *Government Effectiveness* highlights further systemic challenges. Basic public services such as education and healthcare are widely accessible, but their efficiency is perceived as uneven, and public administration is assessed as politicized rather than independent. Strategic policy formulation is weak, with long-term objectives often absent or poorly implemented. Budgetary management lacks transparency, and investments in key areas such as innovation, infrastructure, and education are perceived as inconsistent.

The Rule of Law dimension shows mixed results. While property rights and contract enforcement are assessed as broadly trusted, concerns persist regarding the independence of the judiciary and the predictability of legislative processes. Trust in law enforcement remains fragile.

Control of Corruption emerges as a particularly critical area of concern. Corruption is perceived as widespread and impeding access to services, while businesses report risks of unfair competition through favoritism and bribery. Legal frameworks to combat corruption are considered insufficiently effective, and political decision-making is vulnerable to elite influence. Although journalists and civil society actors can report on corruption, whistleblower protection remains weak, undermining accountability.

The governance of bioeconomy-specific risks reveals an even more fundamental limitation. Partners reported that no explicit regional bioeconomy strategy currently exists in Nitra. As a result, trade-offs related to sustainability, environmental pressures, or socio-economic distribution are not formally acknowledged in policy frameworks.

External support mechanisms primarily appear to be both present and accessible. Stakeholders recognize that funding and technical assistance opportunities exist, but the structuring and tailoring of such measures to regional needs is less evident. The perceived impact of external support is neutral

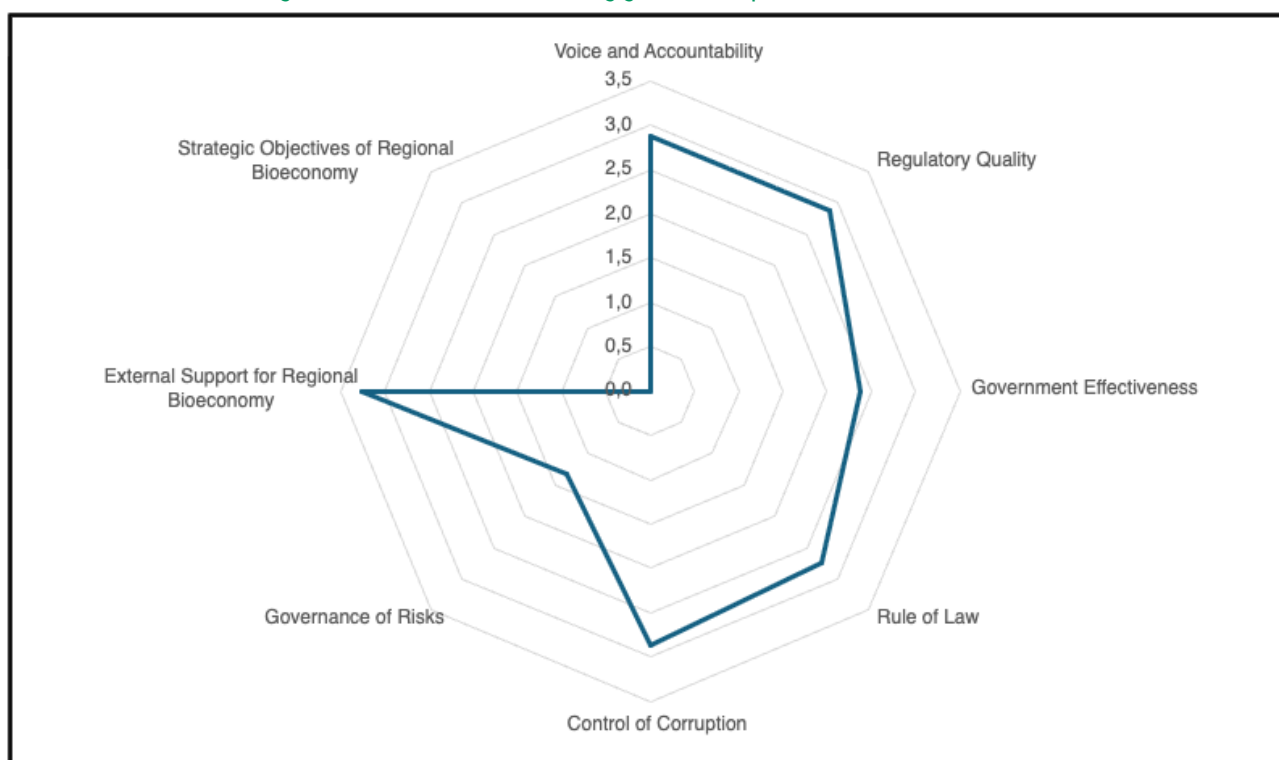
rather than strongly positive, with concerns about sustainability, continuity, and the degree to which capacity-building translates into long-lasting institutional competencies. This reflects a gap between available resources and effective local absorption capacity.

Finally, the absence of a clearly formulated regional bioeconomy strategy is a defining limitation. Without articulated goals, measurable indicators, or cross-sectoral integration, the region lacks a guiding framework to translate national ambitions and European opportunities into localized transformation pathways. This creates a situation where potential strengths, such as the presence of a strong agricultural knowledge base and emerging bio-based value chains, are potentially not systematically leveraged.

In summary, the self-assessment results, although reflecting the national rather than strictly regional level, highlight significant governance aspects for a regional transformation towards a bioeconomy that are directly relevant for the Nitra region.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Strategic Objectives of Regional Bioeconomy* and *Governance of Risks* (Fig. 18).

Figure 18: Assessment of existing governance practices in Nitra, Slovakia.



4.9.3 SWOT Analysis of Existing Governance Practices

From the self-assessment and contextual analysis of the Nitra region, key implications regarding the governance framework for transitioning towards a circular bioeconomy have been identified.

Strengths

In Nitra, strengths encompass relatively open market access, the availability of external support, and robust agricultural institutional capacities. The strong agricultural base and growing industrial capacity provide a solid foundation for developing bio-based value chains and implementing circular bioeconomy models. Furthermore, the region benefits from institutions, including the Slovak University of Agriculture and the National Agriculture and Food Centre, which support knowledge transfer and innovation in agriculture and the bioeconomy. Socio-economic aspects, including high economic performance, labor market participation, and education levels, indicate economic resilience, a stable human capital base for bioeconomy growth, and investment attractiveness.

Weaknesses

In the Nitra region, weak citizen participation and low accountability mechanisms pose a significant challenge to inclusive governance. Limited participatory processes, a lack of transparency, and weak feedback loops reduce both the legitimacy and the effectiveness of decision-making. Public administration is perceived as politicized, resulting in the absence or poor implementation of long-term strategic objectives, which undermines policy execution and innovation support. Moreover, perceived widespread corruption continues to erode institutional trust, distort fair competition, and discourage investment. Although property rights are generally trusted, persistent concerns about judicial independence and legal predictability weaken legal certainty for businesses and investors. A further structural weakness is the absence of a clearly defined regional bioeconomy strategy. Without articulated goals, measurable targets, and cross-sectoral coordination, governance remains fragmented and transformation potential is limited. While external funding and support mechanisms are available, the region's limited capacity to absorb and sustain these resources prevents their full impact.

Opportunities

EU and national funding mechanisms for bioeconomy and innovation offer important opportunities to strengthen regional capacity. Access to external financial and technical resources can support targeted capacity building, improve infrastructure, and enhance governance frameworks, thereby enabling more effective and coordinated bioeconomy development.

Threats

Persistent governance and corruption challenges at the national level represent a critical threat to the effective implementation of bioeconomy strategies at the regional scale. Political influence and instability within regulatory environments, including the politicization of administration and weak judicial independence, can increase uncertainty for investors and reduce stakeholder confidence. Limited policy coherence and the region's dependence on national frameworks can restrict strategic autonomy and hinder the development of tailored governance solutions. Furthermore, economic disparities and comparatively low income levels may reduce investment capacity and weaken public support for transformative bioeconomy initiatives.

Potential areas of action for improving governance performance in Nitra

To improve governance performance in Nitra, targeted action should focus on strengthening participatory mechanisms, transparency, and accountability to build trust and legitimacy in decision-making. Developing a clear and coordinated regional bioeconomy strategy with measurable objectives would provide strategic direction and reduce governance fragmentation. Enhancing institutional capacity to effectively absorb and manage external funding can amplify the impact of EU and national support mechanisms. Furthermore, reducing political influence in public administration and addressing corruption risks would help create a more predictable and stable regulatory environment, improving investor confidence and supporting long-term bioeconomy transformation.

Further priorities should lie in expanding targeted education and vocational training, simplifying funding access, creating flexible and clear policy frameworks, and upgrading rural infrastructure. Better collaboration between research institutions and industry, driven by entities like the Slovak University of Agriculture and the Bioeconomy Cluster, along with stronger links to European bioeconomy networks, will be essential. Promoting ongoing knowledge exchange among farmers, entrepreneurs, and technology providers will help Nitra fully harness its agricultural strengths to build a future-ready circular bioeconomy.

4.10 Carpathian Region, Ukraine

Figure 19: Map of oblasts in Ukraine.



Created with MapChart

As reported in the RIBES Deliverables 2.1 and 2.2 (Müller et al., 2025; Wintjes et al., 2025), the Carpathian region is abundant in natural resources and holds significant potential for bioeconomy development, especially within its forestry and agricultural sectors. Although early efforts to incorporate bio-based innovations are underway, current initiatives are still fragmented and relatively small in scale. Key opportunities include improving sustainable forestry practices, increasing biomass production, and better integrating these systems with local agricultural activities. Social innovation, encouraged through active stakeholder engagement and cross-sector collaboration, can enhance the region's capacity to develop inclusive and resilient bio-based value chains. Promising areas for transformation include timber and non-timber forest products, biomass-based energy, and eco-tourism goods and services.

4.10.1 Socio-Economic Profile

The Carpathian region (highlighted in dark green in Fig. 19) of Ukraine is situated in the country's western part. It includes the western half of Chernivtsi Oblast, the southern half of Ivano-Frankivsk

Oblast, the southwestern part of Lviv Oblast, and the northeastern part of Zakarpattia Oblast¹. In 2022², it had a population of 5,935,613 residents. The region's Gross Regional Product (GRP) totaled 136,517.5 million UAH³, with a per capita GRP of 82,249 UAH—below the national average of 131,734 UAH. The Carpathian region makes up 10% of Ukraine's total gross regional product. Its economy is mainly driven by the service sector. Agriculture, forestry, and the processing of forest products also play important roles. Despite its rich natural resources, the region faces increasing environmental challenges, such as deforestation, floods, air pollution, and soil erosion (Semiv et al., 2023; SSSU, 2025).

Unlike other RIBES regions, the socio-economic profile of the Carpathian region cannot be based on Eurostat datasets because there is no available Ukrainian data. Instead, the analysis uses data from the State Statistics Service of Ukraine, averaged across the four Ukrainian oblasts representing the Carpathian region (SSSU, 2025). This difference in data sources means that some indicators are not directly comparable with those for other regions. Regarding economic output, no regional turnover data are available. GVA in 2021 for NACE A (agriculture, forestry, and fishing) was 50,461,510.2 thousand UAH, accounting for 6.5% of Ukraine's total for this sector. For NACE C (manufacturing), GVA reached 614,552,554.2 thousand UAH, representing 25.2% of the national total. Since NACE A is entirely within the bioeconomy, and NACE C is only partially relevant, these figures should be interpreted with caution. No regional Ukrainian GVA data are available for NACE D. Employment data show that in 2021, NACE A employed 562.2 thousand people in the Carpathian region, which is 24.3% of Ukraine's total employment in the sector. Employment in NACE C was 314.3 thousand, equivalent to 13.6% of the national total, though only part of this sector is directly relevant to the bioeconomy.

The regional labor force participation rate for individuals aged 15–70 was 60%, slightly below the national average of 61.8%. Informal employment was notably high at 27.1% (Ukraine: 19.3%), indicating a significant share of workers outside formal employment structures. In 2021, the unemployment rate was 9.2%, close to the national rate of 9.9%, but well above the EU-27 average of 5.9% in 2024. The employment rate for the same age group was 54.5%, slightly below the Ukrainian average of 55.7% and significantly below the EU-27 benchmark of 61.7% in 2024. Due to a lack of regional data, analyzing workforce composition by gender, education, or age is limited.

The region's real disposable income in 2021 grew by 7.9% from the previous year, slightly below the national growth rate of 9.2%. Disposable income per capita was 71,475.25 UAH, which is significantly lower than the national average of 90,036 UAH, highlighting a relative income gap that could impact household consumption, savings, and investment capacity. Overall, the available socio-economic data indicate a region with notable agricultural and manufacturing capacity but characterized by lower-than-average income levels, relatively high informal employment, and limited labor market participation compared to EU benchmarks. These structural factors will influence both the capacity and pace of a bioeconomy transition, emphasizing the need for targeted investments, formalization of economic

¹ Due to data availability constraints, the following analysis considers the four oblasts collectively.

² Due to data availability, the reported population refers to the status as of 1 February 2022, prior to the outbreak of Russia's full-scale invasion and war against Ukraine on 24 February 2022. The subsequent internal displacement and international migration are likely to have significantly altered the actual number of inhabitants since then.

³ UAH is the national currency of Ukraine, the Ukrainian Hryvnia. 1 UAH = 0.02 EUR, as of 17.08.2025.

activities, and skills development to fully realize the Carpathian region's bioeconomy potential (SSSU, 2025).

4.10.2 Self-assessment of Existing Governance Practices

The self-assessment of governance practices in the Carpathian region reveals a predominantly critical picture, with systemic weaknesses across most governance dimensions and only isolated areas of relative strength.

In terms of *Voice and Accountability*, citizen participation in political decision-making remains limited. Respondents disagreed with the notion that citizens actively co-design policies related to the bioeconomy or green transition. Instead, participation often occurs reactively through NGOs or community protests in response to environmental crises, such as illegal logging or poorly planned wind power projects. Platforms for structured dialogue exist in the form of innovation project competitions, startup grants, and regional forums, but these mechanisms are donor-driven, temporary, and not embedded into formal institutional structures. Transparency was rated negatively, as regional strategies and programs exist at the oblast level, but the implementation, funding, and monitoring of these decisions are insufficiently communicated to the public. At the same time, basic participation rights and freedom of expression were evaluated more positively, with demonstrations and protests being a common and tolerated practice. However, the influence of media, particularly in Zakarpattia, remains constrained by political and business interests, which limits the overall openness of the information environment.

Perceptions of *Regulatory Quality* highlight significant governance weaknesses. While setting up a business is considered straightforward thanks to digital platforms such as "Diia"¹ and some regional grant schemes, long-term regulatory stability is absent. Respondents strongly disagreed that rules provide predictability for investment, citing frequent changes in subsidies, timber auction rules, and certification costs. This instability undermines planning in agriculture and forestry-based enterprises, which are crucial for the bioeconomy. Moreover, strong disagreement was expressed concerning government interventions in markets and financial sector regulation. State interference in prices, subsidies, and contracts is perceived as distorting competition rather than stabilizing markets, while regulatory oversight in the financial sector is viewed as inadequate, exposing businesses to risks of manipulation and political influence.

The indicator of *Government Effectiveness* is also perceived rather negatively. Although basic services such as education, healthcare, and public transport are accessible, their quality varies sharply between urban centers and rural areas. Respondents strongly disagreed that public services are efficient or adapted to the population's needs. Civil service independence is perceived as low, with political influence shaping administrative decisions. While the e-governance platform "Diia" has facilitated some processes, local bureaucracies remain slow, non-transparent, and prone to informal practices. Policy formulation and implementation are considered ineffective, as existing strategies (e.g., Lviv's Smart Specialization 2021–2027, Zakarpattia Development Strategy) lack clarity on funding and execution.

¹ <https://diia.gov.ua/>

Budgetary transparency is also rated very poorly. Although data formally exist, citizens have little awareness or influence over allocations. Investment planning in key sectors such as innovation is highly uneven, with Lviv showing promising support while Zakarpattia remains largely excluded.

With regard to the *Rule of Law*, citizens and businesses reported very low levels of trust. The judiciary is perceived as slow and influenced by political elites, and law enforcement is viewed as ineffective, particularly in tackling illegal timber logging and unauthorized resource extraction. While contracts and property rights are formally respected, their enforcement is unreliable, especially in forestry where frequent price and regulatory changes create high uncertainty. Respondents strongly disagreed that the legal system is transparent or predictable.

The indicator *Control of Corruption* was also assessed very negatively. Citizens and businesses encounter widespread corruption in public services, and public officials are not perceived as independent or accountable. Respondents strongly disagreed that decision-making is free from elite or private influence. Although civil society and journalists can report on corruption and protests are tolerated, protection for whistleblowers is weak, and investigations into corruption cases are rarely effective.

Bioeconomy-specific indicators further underscore these systemic weaknesses. In terms of *Governance of Risks*, regional strategies rarely address trade-offs, and political measures to mitigate conflicts, such as community opposition to wind farms or concerns over biodiversity loss, are largely absent. Monitoring and adaptability mechanisms were rated negatively.

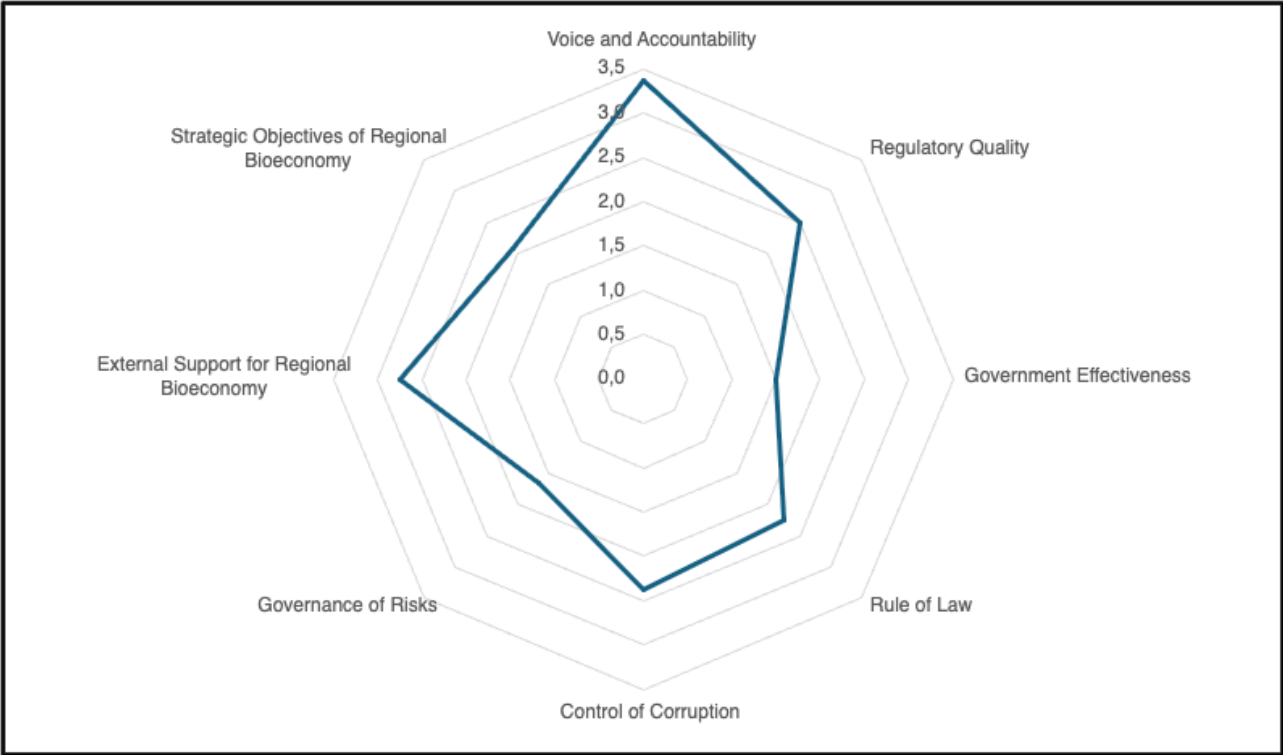
Perceptions of *External Support* are more positive but still mixed. Citizens and businesses are aware of EU and international funding schemes, and some capacity-building programs have generated a skilled cohort of professionals in the regional bioeconomy. However, access to external support remains fragmented, poorly communicated, and heavily reliant on personal networks. Respondents agreed that external projects provide positive impacts, especially in supporting startups and pilot initiatives, but noted that their short-term and project-based nature limits structural transformation. Sustainability and long-term embedding of external support were evaluated negatively.

The most striking governance gap concerns the *Strategic Objectives of the Regional Bioeconomy*. Respondents strongly disagreed that a clear regional bioeconomy strategy exists in the Carpathian region. While Lviv has a relatively comprehensive strategy, other oblasts such as Zakarpattia lack equivalent frameworks. Awareness of tangible measures or financial instruments supporting bioeconomy objectives is low, and stakeholder involvement in implementation is limited. Integration with other policy areas (e.g., climate, agriculture, or industry) was rated negatively, as was adaptability of strategies to new challenges. Respondents also disagreed that any visible results or pilot projects have emerged.

In summary, the self-assessment paints a picture of the Carpathian region as a governance environment marked by weak institutional capacity, low regulatory predictability, and pervasive corruption risks, combined with fragmented strategies and poor policy implementation. Strengths include relatively open freedom of expression, tolerance of civic protest, and accessible business registration.

The quantification of perceptions regarding existing governance practices also shows that respondents see a particular need for action in the areas of *Strategic Objectives of Regional Bioeconomy*, *Governance of Risks*, *Regulatory Quality*, *Government Effectiveness*, *Rule of Law*, and *Control of Corruption* ([Fig. 20](#)).

Figure 20: Assessment of existing governance practices in the Carpathian Region, Ukraine.



4.10.3 SWOT Analysis of Existing Governance Practices

The self-assessment and contextual analysis of the Carpathian region reveal several implications for the governance framework necessary for a successful shift to a circular bioeconomy.

Strengths

The Carpathian region possesses several internal factors that provide a distinct advantage for the development of the bioeconomy. The area's abundant natural resources, particularly in forestry and agriculture, form a robust foundation for bioeconomy activities. This natural wealth offers significant opportunities for the sustainable extraction and utilization of biological resources. The presence of existing bioeconomy pilot initiatives further underscores the region's potential. These early efforts and small-scale projects demonstrate local capacity and readiness to embark on bio-based innovations, paving the way for future advancements in the sector. Entrepreneurial endeavors benefit greatly from accessible business registration, particularly through digital platforms like "Diia". This ease of access reduces initial bureaucratic barriers, fostering a more conducive environment for the establishment of bio-based businesses. Additionally, the region is characterized by a tolerance of civic protests and a strong commitment to freedom of expression. This openness allows citizens and NGOs to voice environmental concerns, which can inform and guide the development of more sustainable bioeconomic practices. Finally, there is a widespread awareness of EU and international funding schemes. This existing knowledge, coupled with partial access to external support, offers significant leverage for capacity building and project financing, enhancing the region's ability to capitalize on bioeconomy opportunities.

Weaknesses

A significant weakness is the lack of a coherent regional strategy, which impedes coordinated action and limits measurable progress in bioeconomy initiatives in the Carpathian region. This absence of strategic direction makes it difficult to align efforts and achieve long-term objectives. Regulatory predictability and governance are also areas of concern and create an unstable environment that discourages investment and complicates planning efforts. This unpredictability could undermine stakeholder confidence and reduce potential growth in the bioeconomy sector. High levels of corruption and low independence of public officials further exacerbate these challenges. These issues could undermine trust in institutions, distort competitive practices, and risk the misallocation of resources designated for bioeconomy projects. Consequently, the effectiveness of initiatives is compromised. Additionally, inefficient public administration and uneven service quality present operational obstacles. With slow bureaucracies, poor budget transparency, and unequal access to services, the region struggles with limited implementation capacity. Furthermore, limited stakeholder participation and a lack of structured dialogue affect the decision-making process. Decisions may tend to be reactive rather than co-created, reducing community ownership and jeopardizing the long-term sustainability of bioeconomy initiatives.

Opportunities

The Carpathian region presents notable opportunities to advance the bioeconomy by leveraging existing social innovation and aligning with EU frameworks. First, current civic participation, such as protests and grassroots activism, can be harnessed to establish structured participatory governance mechanisms. By transforming reactive civic engagement into systematic stakeholder involvement,

local ownership and acceptance of bioeconomy initiatives can be strengthened, fostering more resilient and inclusive regional bio-based value chains. Second, greater harmonization with EU bioeconomy frameworks offers the potential to improve regulatory coherence and market predictability. Aligning regional policies with EU standards can enhance investor confidence, attract private sector participation, and stimulate innovation ecosystems. Such integration not only supports long-term planning and investment security but also positions the Carpathian region to benefit from broader European initiatives promoting sustainable and circular bioeconomy development.

Threats

The development of a sustainable bioeconomy in the Carpathian region is challenged by several external threats. Political and regulatory instability, characterized by frequent policy changes, shifting subsidy regimes, and weak enforcement of legal frameworks, undermines investor confidence and complicates long-term planning for bio-based businesses. Additionally, elite capture and corruption risks present a significant barrier. Influence by political-business networks can distort competition, reduce transparency, and limit fair access to opportunities, potentially deterring private sector involvement and EU cooperation in regional bioeconomy projects. Finally, low income levels combined with high informal employment constrain household investment capacity and slow the formalization of the economy. These socio-economic factors limit the financial base necessary for innovation, skills development, and infrastructure improvement, posing a structural risk to the successful scaling of bioeconomic initiatives.

Potential areas of action for improving governance performance in the Carpathian Region

To enhance governance performance, the Carpathian region can focus on translating civic engagement into structured participatory mechanisms, increasing regulatory stability, and improving transparency and accountability. Aligning regional policies with EU bioeconomy frameworks can further strengthen market predictability, attract investment, and foster inclusive and resilient bio-based value chains. Addressing these governance gaps is essential to unlocking the region's full bioeconomic potential and enabling sustainable, long-term development.

5. Conclusion

The governance analysis conducted across the RIBES regions reveals a diverse yet convergent pattern of institutional strengths and systemic challenges that influence the transition toward a sustainable and inclusive circular bioeconomy (CBE). Despite contextual differences, several cross-cutting trends emerge regarding the quality of governance, institutional coordination, and stakeholder participation.

5.1 Good Governance Practices

Across the RIBES regions, several examples of good governance can be observed. First, **institutional collaboration and access to external support** stand out as key enablers. Many regions—such as Campania, Plovdiv, and the North Aegean—actively utilize EU structural funds, Horizon Europe programs, and national funding schemes to stimulate innovation and entrepreneurship. This external engagement not only compensates for domestic funding limitations but also encourages cross-regional learning and integration into broader European innovation networks. Second, **the presence of strong academic and research institutions** provides an essential foundation for knowledge transfer and innovation. Regions such as Nitra and Campania demonstrate that partnerships between universities, cooperatives, and small enterprises can foster bio-based innovation ecosystems, supporting both technological and social dimensions of the bioeconomy. Finally, some regions show **progress in strategic orientation**, such as Campania's structured bioeconomy strategy or Plovdiv's integration of bioeconomy goals into regional innovation plans. These examples demonstrate emerging institutional awareness and growing political commitment to systemic transformation.

5.2 Governance Challenges

Despite these promising practices, several governance weaknesses remain consistent across the RIBES regions. A key challenge lies in **fragmented institutional coordination** and weak strategic integration. Many regions lack a coherent bioeconomy strategy or suffer from limited cross-sectoral alignment between agriculture, energy, waste, and innovation policies. This results in overlapping responsibilities, low policy coherence, and insufficiently defined implementation mechanisms.

Limited participation and accountability further constrain effective governance. In most regions, citizen involvement in policymaking remains formalistic, with consultation processes that seldom influence final decisions. Weak feedback loops and limited inclusivity, particularly regarding rural and marginalized communities, undermine social legitimacy and hinder innovation diffusion.

Regulatory instability and administrative inefficiency persist across several regions. High bureaucratic burdens, inconsistent enforcement of regulations, and limited capacity for long-term planning reduce policy predictability and investor confidence.

Another recurrent issue concerns the **Rule of Law** and **Control of Corruption**. Low trust in judicial independence and frequent perceptions of corruption or political interference erode governance credibility and reduce the willingness of private actors to engage in bio-based ventures.

Finally, most regions lack **formal mechanisms for risk governance** in the bioeconomy. Environmental trade-offs, social distribution effects, and economic vulnerabilities are rarely addressed systematically,

which increases exposure to unintended consequences such as resource overexploitation or unequal benefit-sharing.

5.3 Future Areas of Action

The comparative assessment of governance practices across the RIBES regions indicates that effective bioeconomy transformation depends not only on technological innovation but also on the institutional quality, inclusiveness, and adaptability of governance systems. Building on the analysis, three overarching priorities and action fields emerge for strengthening governance structures throughout the RIBES region:

I. Develop Integrated Regional Bioeconomy Strategies

- Establish clear strategic objectives, measurable indicators, and monitoring systems aligned with EU Green Deal targets.
- Promote cross-sectoral coordination by integrating agriculture, energy, environment, and innovation policies under a unified governance framework.
- Encourage regions without dedicated strategies to adopt adaptive roadmaps that reflect local conditions and stakeholder needs.

II. Enhance Transparency, Participation, and Accountability

- Institutionalize participatory governance through continuous stakeholder engagement, moving beyond ad-hoc consultations toward co-decision processes.
- Strengthen local governance capacity by supporting civic networks, cooperatives, and social enterprises that promote inclusive entrepreneurship.
- Introduce transparent monitoring tools and feedback mechanisms that increase accountability of public institutions and improve trust among citizens.

III. Strengthen Institutional Capacity and Risk Governance

- Build administrative competencies for managing complex bioeconomy transitions, including project management, data-driven policymaking, and evaluation.
- Implement anti-corruption measures and judicial reforms that safeguard fairness, transparency, and predictability.
- Develop systematic approaches for managing bioeconomy-related risks—environmental, social, and economic—to ensure long-term sustainability and resilience.

In conclusion, while governance maturity across the RIBES regions remains uneven, there is clear potential for progress through coordinated capacity-building, institutional learning, and cross-regional cooperation. Strengthening governance for an inclusive circular bioeconomy requires moving from fragmented, top-down policy frameworks toward adaptive, participatory, and transparent governance systems that empower local actors and ensure equitable and sustainable transformation across Europe's rural regions.

6. Outlook

The insights from this governance appraisal provide a strategic foundation for the next steps in WP4 and will directly inform several upcoming project activities:

Contribution to Governance Toolkits (Task 4.3):

The findings of Task 4.1 will feed into the co-development of governance toolkits under Task 4.3, coordinated by UHOH with contributions from INCE, BIOCOM, UNU-MERIT, and regional partners. These toolkits will operationalize the lessons learned from the governance analysis, providing practical guidance and methodological frameworks for enabling inclusive and adaptive CBE governance. Key thematic components—such as priority setting, decision-making hierarchies, change management, and institutional transformation—will draw directly on the identified regional needs and good practices documented in this deliverable.

Support for MTFs in Co-creative Development:

The results of this assessment will equip the MTFs with empirical evidence and governance insights to guide their co-development workshops. By integrating regional governance dynamics into these participatory processes, MTFs will be able to co-create new governance approaches and models that are better aligned with local realities and stakeholder expectations.

Input for Policy Briefs (Task 4.4):

The synthesized governance findings will serve as input for the three policy briefs to be developed under Task 4.4 by ERDN and partners. These briefs will translate project-level insights into policy guidance, aiming to strengthen horizontal and vertical coordination mechanisms and embed effective governance frameworks within EU and national bioeconomy strategies. Through these outputs, RIBES will ensure that its results are anchored at the political and institutional level, influencing future policy development for social enterprises in the CBE.

Contribution to RIBES' Overall Objective:

Collectively, these outcomes ensure that WP4 contributes decisively to achieving RIBES' overarching goal: the establishment of an inclusive, sustainable, and resilient circular bioeconomy in Europe's rural and peri-urban regions. By combining analytical rigor, participatory governance, and practical co-development, RIBES strengthens the institutional foundations necessary for transformative, long-term change.

7. Literature

- ASK. (2025). *ASKdata* [Online post]. <https://askdata.rks-gov.net/pxweb/sq/ASKdata/>
- Barra, C., & Falcone, P. M. (2024). Institutional quality and bioeconomy performance in European countries: Unveiling the evidence. *Ecological Economics*, 220, 108188. <https://doi.org/10.1016/j.ecolecon.2024.108188>
- Baur, I., Dobricki, M., & Lips, M. (2016). The basic motivational drivers of northern and central European farmers. *Journal of Rural Studies*, 46, 93–101. <https://doi.org/10.1016/j.jrurstud.2016.06.001>
- BHAS. (2025). *Agency for Statistics of Bosnia and Herzegovina* [Online post]. <https://bhas.gov.ba/Home/>
- Biber-Freudenberger, L., Basukala, A. K., Bruckner, M., & Börner, J. (2018). Sustainability Performance of National Bio-Economies. *Sustainability*, 10(8), 2705. <https://doi.org/10.3390/su10082705>
- Bößner, S., Johnson, F. X., & Shawoo, Z. (2021). Governing the Bioeconomy: What Role for International Institutions? *Sustainability*, 13(1), Article 1. <https://doi.org/10.3390/su13010286>
- Capasso, M., & Klitkou, A. (2020). Socioeconomic Indicators to Monitor Norway's Bioeconomy in Transition. *Sustainability*, 12(8), 3173. <https://doi.org/10.3390/su12083173>
- Carraresi, L., Berg, S., & Bröring, S. (2018). Emerging value chains within the bioeconomy: Structural changes in the case of phosphate recovery. *Journal of Cleaner Production*, 183, 87–101. <https://doi.org/10.1016/j.jclepro.2018.02.135>
- D'Adamo, I., Falcone, P. M., & Morone, P. (2020). A New Socio-economic Indicator to Measure the Performance of Bioeconomy Sectors in Europe. *Ecological Economics*, 176, 106724. <https://doi.org/10.1016/j.ecolecon.2020.106724>
- Dahl, A. L. (2012). Achievements and gaps in indicators for sustainability. *Ecological Indicators*, 17, 14–19. <https://doi.org/10.1016/j.ecolind.2011.04.032>
- Diaz-Chavez, R. (2014). Indicators for Socio-Economic Sustainability Assessment. In D. Rutz & R. Janssen (Eds.), *Socio-Economic Impacts of Bioenergy Production* (pp. 17–37). Springer International Publishing. https://doi.org/10.1007/978-3-319-03829-2_2
- Diaz-Chavez, R., Mortensen, S., & Wikman, A. (2019). *Bioeconomy: Tapping natural and human resources to achieve sustainability*. Stockholm Environment Institute.
- Dietz, T., Börner, J., Förster, J. J., & Von Braun, J. (2018). Governance of the Bioeconomy: A Global Comparative Study of National Bioeconomy Strategies. *Sustainability*, 10(9), Article 9. <https://doi.org/10.3390/su10093190>
- Dokov, H. (2024). Bulgaria's regional policy: Analysing paradigm shifts and dynamics of territorial inequalities. *Environmental & Socio-Economic Studies*, 12(3), 37–50. <https://doi.org/10.2478/enviro-2024-0018>
- Donner, M., Erraach, Y., López-i-Gelats, F., Manuel-i-Martin, J., Yatribi, T., Radić, I., & El Hadad-Gauthier, F. (2022). Circular bioeconomy for olive oil waste and by-product valorisation: Actors' strategies and conditions in the Mediterranean area. *Journal of Environmental Management*, 321, 115836. <https://doi.org/10.1016/j.jenvman.2022.115836>

- El-Chichakli, B., Von Braun, J., Lang, C., Barben, D., & Philp, J. (2016). Policy: Five cornerstones of a global bioeconomy. *Nature*, 535(7611), 221–223. <https://doi.org/10.1038/535221a>
- Eurostat. (2025). *Database*. Eurostat. https://ec.europa.eu/eurostat/databrowser/explore/all/tb_eu?lang=en&subtheme=shorties.tei_euro_na&display=list&sort=category
- Feller-Länzlinger, R., Haefli, U., Rieder, S., Biebricher, M., & Weber, K. (2020). *Messen, werten, steuern. Indikatoren – Entstehung und Nutzung in der Politik*. TA-SWISS Zentrum für Technologiefolgen-Abschätzung.
- Flagship 3: Accelerating and strengthening innovation in European Innovation Ecosystems across the EU and addressing the innovation divide*. (2025). [Online post]. European Commission Research and Innovation. https://research-and-innovation.ec.europa.eu/strategy/support-policy-making/shaping-eu-research-and-innovation-policy/new-european-innovation-agenda/new-european-innovation-agenda-roadmap/flagship-3-accelerating-and-strengthening-innovation-european-innovation-ecosystems-across-eu-and_en
- Gawel, E., Purkus, A., Pannicke, N., & Hagelmann, N. (2016). Die Governance der Bioökonomie—Herausforderungen einer Nachhaltigkeitstransformation am Beispiel der holzbasierten Bioökonomie in Deutschland. *UFZ Discussion Papers*, 2.
- Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, 31(8–9), 1257–1274. [https://doi.org/10.1016/S0048-7333\(02\)00062-8](https://doi.org/10.1016/S0048-7333(02)00062-8)
- Horbach, J. (2008). Determinants of environmental innovation—New evidence from German panel data sources. *Research Policy*, 37(1), 163–173. <https://doi.org/10.1016/j.respol.2007.08.006>
- INSTAT. (2025). *Statistical Database* [Online post]. <https://databaza.instat.gov.al:8083/pxweb/en/DST/>
- Issa, I., Delbrück, S., & Hamm, U. (2019). Bioeconomy from experts' perspectives – Results of a global expert survey. *PLOS ONE*, 14(5), e0215917. <https://doi.org/10.1371/journal.pone.0215917>
- Jander, W., Wydra, S., Wackerbauer, J., Grundmann, P., & Piotrowski, S. (2020). Monitoring Bioeconomy Transitions with Economic–Environmental and Innovation Indicators: Addressing Data Gaps in the Short Term. *Sustainability*, 12(11), 4683. <https://doi.org/10.3390/su12114683>
- Kardung, M., Cingiz, K., Costenoble, O., Delahaye, R., Heijman, W., Lovrić, M., Van Leeuwen, M., M'Barek, R., Van Meijl, H., Piotrowski, S., Ronzon, T., Sauer, J., Verhoog, D., Verkerk, P. J., Vracholi, M., Wesseler, J. H. H., & Zhu, B. X. (2021). Development of the Circular Bioeconomy: Drivers and Indicators. *Sustainability*, 13(1), 413. <https://doi.org/10.3390/su13010413>
- Kaufmann, D., & Kraay, A. C. (2024). *The Worldwide Governance Indicators: Methodology and 2024 Update* (No. No 10952; Policy Research Working Paper Series). The World Bank. <https://documents1.worldbank.org/curated/en/099005210162424110/pdf/IDU17c6f0b9e1f0c214b1d1b30d176c4644af69e.pdf>
- MAFF. (2021). *Census of agricultural holdings in 2020. Grant No 2019.0191* (No. No 390). Ministry of Agriculture, Food and Forestry, Agrostistics departement.

https://www.mzh.government.bg/media/filer_public/2021/12/09/publication_preliminary_data_census_2020_en.pdf

- Marchi, M., Ferrara, C., Bertini, G., Fares, S., & Salvati, L. (2017). A sampling design strategy to reduce survey costs in forest monitoring. *Ecological Indicators*, 81, 182–191. <https://doi.org/10.1016/j.ecolind.2017.05.011>
- Marcone, R. D., Schmid, M., & Meylan, G. (2022). Closing the gap between EU-wide national bioeconomy monitoring frameworks and urban circular bioeconomy development. *Journal of Cleaner Production*, 379, 134563. <https://doi.org/10.1016/j.jclepro.2022.134563>
- Meinzen-Dick, R., Kovarik, C., & Quisumbing, A. R. (2014). Gender and Sustainability. *Annual Review of Environment and Resources*, 39(1), 29–55. <https://doi.org/10.1146/annurev-environ-101813-013240>
- Müller, M., Fischer, L., & Pyka, A. (2025). *Regional ecosystems mapping and surveying report* (RIBES Project Deliverable No. D2.2; pp. 1–94). <https://ribesproject.eu/deliverables/>
- National Academies of Sciences, Engineering, and Medicine, Committee on Safeguarding the Bioeconomy: Finding Strategies for Understanding, Evaluating, and Protecting the Bioeconomy While Sustaining Innovation and Growth, Board on Life Sciences, Board on Agriculture and Natural Resources, Board on Science, Technology, and Economic Policy, Board on Health Sciences Policy, Forum on Cyber Resilience, Division on Earth and Life Studies, Policy and Global Affairs, Health and Medicine Division, & Division on Engineering and Physical Sciences. (2020). *Safeguarding the Bioeconomy* (p. 25525). National Academies Press. <https://doi.org/10.17226/25525>
- Nelson, R. R., & Nelson, K. (2002). Technology, institutions, and innovation systems. *Research Policy*, 31(2), 265–272. [https://doi.org/10.1016/S0048-7333\(01\)00140-8](https://doi.org/10.1016/S0048-7333(01)00140-8)
- OECD. (2024). *Towards Balanced Regional Development in Croatia. From Strategy Design to Implementation* (1st ed). Organization for Economic Cooperation & Development.
- Papadopoulou, C.-I., Loizou, E., Chatzitheodoridis, F., Michailidis, A., Karelakis, C., Fallas, Y., & Paltaki, A. (2023). What Makes Farmers Aware in Adopting Circular Bioeconomy Practices? Evidence from a Greek Rural Region. *Land*, 12(4), 809. <https://doi.org/10.3390/land12040809>
- Porter, C. E., & Donthu, N. (2006). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research*, 59(9), 999–1007. <https://doi.org/10.1016/j.jbusres.2006.06.003>
- Pyka, A. (2017). Die Bioökonomie unter dem Blickwinkel der Innovationsökonomie. In *Bioökonomie für Einsteiger* (pp. 129–138). Springer Spektrum Berlin.
- Rogers, E. M. (1962). *Diffusion of Innovations*. Free Press.
- Ronzon, T., & M'Barek, R. (2018). Socioeconomic Indicators to Monitor the EU's Bioeconomy in Transition. *Sustainability*, 10(6), 1745. <https://doi.org/10.3390/su10061745>
- Rossi, A. M., & Hinrichs, C. C. (2011). Hope and skepticism: Farmer and local community views on the socio-economic benefits of agricultural bioenergy. *Biomass and Bioenergy*, 35(4), 1418–1428. <https://doi.org/10.1016/j.biombioe.2010.08.036>

- Rzeszow Regional Development Agency. (2024). *Regional Study: Podkarpackie/ Poland* (No. 02C0697; EAGER (Easing AGrophotovoltaics for EuRope)). https://www.interregeurope.eu/sites/default/files/2025-02/EAGER_Joint%20Study_Annex%206_PL.pdf
- Sanz-Hernández, A., Jiménez-Caballero, P., & Zarauz, I. (2022). Gender and women in scientific literature on bioeconomy: A systematic review. *Forest Policy and Economics*, 141, 102762. <https://doi.org/10.1016/j.forpol.2022.102762>
- Schedler, K. (2004). 15. Developing Performance Indicators and Measurement Systems in Public Institutions. In *Research in Public Policy Analysis and Management* (Vol. 13, pp. 371–394). Emerald (MCB UP). [https://doi.org/10.1016/S0723-1318\(04\)13015-6](https://doi.org/10.1016/S0723-1318(04)13015-6)
- Schmidt, O., Padel, S., & Levidow, L. (2012). The Bio-Economy Concept and Knowledge Base in a Public Goods and Farmer Perspective. *Bio-Based and Applied Economics*, 47-63 Pages. <https://doi.org/10.13128/BAE-10770>
- Semiv, L., Danylyshyn, B., Bachynska, M., Batkovets, N., Piatnychuk, I., & Popadynets, N. (2023). EDUCATIONAL MIGRATION ENVIRONMENT IN CARPATHIAN REGION: MAJOR PROCESS MANAGEMENT DIRECTIONS. *Management Theory and Studies for Rural Business and Infrastructure Development*, 44(4), 406–420. <https://doi.org/10.15544/mts.2022.41>
- SSSU. (2025). *State Statistics Service of Ukraine* [Online post]. <https://ukrstat.gov.ua/>
- Stegmann, P., Londo, M., & Junginger, M. (2020). The circular bioeconomy: Its elements and role in European bioeconomy clusters. *Resources, Conservation & Recycling: X*, 6, 100029. <https://doi.org/10.1016/j.rcrx.2019.100029>
- Stern, P. C. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, 56(3), 407–424. <https://doi.org/10.1111/0022-4537.00175>
- Strogylopoulos, G., Stamos, I., & European Commission (Eds.). (2023). *Monitoring the SDSGs in North Aegean region, Greece*. Publications Office. <https://doi.org/10.2760/39125>
- Vural Gursel, I., Elbersen, B., & Meesters, K. P. H. (2023). Monitoring circular biobased economy – Systematic review of circularity indicators at the micro level. *Resources, Conservation and Recycling*, 197, 107104. <https://doi.org/10.1016/j.resconrec.2023.107104>
- Wensing, J., Carraresi, L., & Bröring, S. (2019). Do pro-environmental values, beliefs and norms drive farmers' interest in novel practices fostering the Bioeconomy? *Journal of Environmental Management*, 232, 858–867. <https://doi.org/10.1016/j.jenvman.2018.11.114>
- Wintjes, R., Müller, M., & Türkeli, S. (2025). *Literature review and conceptual framework; The role of social innovation in transitioning the bioeconomy for sustainable rural development*. (RIBES Project Deliverable No. D2.1; pp. 1–94). <https://ribesproject.eu/deliverables/>
- World Bank. (2025). *Worldwide Governance Indicators*. Worldwide Governance Indicators. <https://www.worldbank.org/en/publication/worldwide-governance-indicators>
- Woźniak, E., Tyczewska, A., & Twardowski, T. (2021). Bioeconomy development factors in the European Union and Poland. *New Biotechnology*, 60, 2–8. <https://doi.org/10.1016/j.nbt.2020.07.004>

- Zavadskas, E., Kaklauskas, A., Šaparauskas, J., & Kalibatas, D. (2007). Vilnius urban sustainability assessment with an emphasis on pollution. *Ekologija*, 53, 64–72. https://www.researchgate.net/publication/291796053_Vilnius_urban_sustainability_assessment_with_an_emphasis_on_pollution
- Zilberman, D., Kim, E., Kirschner, S., Kaplan, S., & Reeves, J. (2013). Technology and the future bioeconomy. *Agricultural Economics*, 44(s1), 95–102. <https://doi.org/10.1111/agec.12054>

8. Annex A

Supplementary Table 1: Page 1 of the Self-assessment template.

DESCRIPTION
This survey is a self-assessment of current governance practices for circular bioeconomy and social innovations in the regions participating in RIBES. The objective is to get an overview of the public perception of the current institutional and legal frameworks. For this purpose, eight performance indicators were developed to assess the effectiveness of current circular bioeconomy governance models and practices in the regions.
PROCEDURE
The eight indicators will be assessed via different statements. To ensure the comprehensibility of the concepts, each indicator is explained verbally before the statements are classified. Questions or ambiguities can be addressed at any time. To obtain a complete picture of your region, we ask you to answer the questions as honestly as possible. The anonymity of the participants and their answers is guaranteed. The performance indicators are listed in the following: Voice and Accountability, Regulatory Quality, Rule of Law, Control of Corruption, Risk Management, External Support, and Bioeconomy Strategy.
INSTRUCTION
Please rate each of the following statements based on the current situation in your region using the scale: Strongly Disagree, Disagree, Neutral, Agree, or Strongly Agree. Indicate in the column where you place the statement about your region on the scale. If you would like to explain the classification in more detail, or if you cannot classify a statement on the scale, please provide a comment with an explanation.

Supplementary Table 2: Page 2 of the Self-assessment template.

VOICE AND ACCOUNTABILITY						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
CITIZEN ENGAGEMENT						
Citizens influence and co-design political decision-making processes.						
Citizens attend platforms for political dialogue, such as workshops and forums with regulated feedback mechanisms.						
TRANSPARENCY						
Citizens receive comprehensive and reliable public information about regional political decisions.						
PARTICIPATION RIGHTS						
All groups of citizens have equal and fair rights to participate in decision-making.						
FREEDOM OF EXPRESSION						
Regional media are independent and citizens receive information on different political viewpoints.						
Citizens are free to express their opinions in public (e.g., demonstrations) without fear of repression.						

Supplementary Table 3: Page 3 of the Self-assessment template.

REGULATORY QUALITY						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
MARKET ACCESS AND ADMINISTRATIVE BURDEN						
Citizens can set up and run a company uncomplicated in your region.						
Market entry is free of administrative or political barriers for businesses (e.g., price controls, tariffs, taxes, or inadequate banking supervision).						
STABILITY AND PREDICTABILITY OF REGULATIONS						
Citizens and businesses are free of influence by short-term political changes and inconsistent regulations.						
As a result of regulatory stability, citizens and businesses benefit from long-term planning.						
GOVERNMENT INTERVENTIONS IN THE MARKETS						
State interference in prices, wages, or subsidies is limited and the market is independent with fair competitive conditions.						
Government interventions are aimed at stabilizing the market rather than controlling it.						
FINANCIAL SECTOR REGULATION						
Businesses consider the financial system to be adequately supervised by the government which protects investors as well as consumers.						
Citizens and businesses perceive no risk of regulatory failure or political manipulation in the financial sector.						

Supplementary Table 4: Page 4 of the Self-assessment template.

GOVERNMENT EFFECTIVENESS						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
QUALITY AND EFFICIENCY OF PUBLIC SERVICES						
Citizens have access to reliable basic services such as education, healthcare, public transport, and amenities equally.						
Citizens perceive public services as efficient and in line with the needs of the population.						
PROFESSIONALISM AND INDEPENDENCE OF PUBLIC ADMINISTRATION						
Citizens perceive public and civil services as independent and free of influence by political interests.						
Citizens and businesses experience transparent, reliable, and efficient administrative processes.						
POLICY FORMULATION AND IMPLEMENTATION						
Policies are based on long-term strategies.						
Public administration can adapt to new challenges.						
Political measures are implemented efficiently and effectively.						
BUDGET AND FINANCIAL MANAGEMENT						
Citizens are aware of how public budgets are managed and allocated.						
Investments in key sectors are planned and implemented efficiently (e.g., education, healthcare infrastructure, or innovation).						

Supplementary Table 5: Page 5 of the Self-assessment template.

RULE OF LAW						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
JUDICIAL INDEPENDENCE AND FAIRNESS						
Citizens and businesses trust that the judiciary system is fair, transparent, and free from political influence.						
ENFORCEMENT OF CONTRACTS AND PROPERTY RIGHTS						
Citizens and businesses rely on contracts to be legally binding and enforced efficiently as well as reliably.						
Citizens and businesses are protected from unlawful expropriation or state intervention (e.g., confiscation or expropriation).						
TRUST IN LAW ENFORCEMENT						
Citizens and businesses trust the police and law enforcement agencies.						
STABILITY AND PREDICTABILITY OF THE LEGAL SYSTEM						
Citizens and businesses experience changes in legislation as a transparent, fair, and predictable process.						

Supplementary Table 6: Page 6 of the Self-assessment template.

CONTROL OF CORRUPTION						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
PREVALENCE AND IMPACT OF CORRUPTION						
Citizens and businesses encounter widespread corruption and are significantly impaired in their access to public services.						
Businesses run the risk of unfair competition through bribery or favoritism.						
LEGAL AND INSTITUTIONAL FRAMEWORKS						
Citizens and businesses benefit from effective laws and institutions to prevent and punish corruption.						
INDEPENDENCE AND ACCOUNTABILITY OF PUBLIC OFFICIALS						
Public officials are bound by ethical standards and subject to accountability mechanisms.						
Political decision-making is free from influence by elites or private interests.						
ROLE OF MEDIA AND CIVIL SOCIETY						
Journalists and civil society actors can report freely on corruption.						
Whistleblowers are protected and their revelations lead to effective investigations.						

Supplementary Table 7: Page 7 of the Self-assessment template.

GOVERNANCE OF RISKS						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
IDENTIFICATION OF RISKS AND TRADE-OFFS						
The regional bioeconomy strategy explicitly recognizes potential social, environmental, and economic trade-offs of the bioeconomy in your region (e.g., biodiversity loss, increased inequality, or overdependence on single sectors).						
POLICY RESPONSE AND STRATEGIC MEASURES						
Concrete political measures are in place to mitigate the risks and resolve conflicting objectives.						
MONITORING AND ADAPTABILITY						
Political mechanisms to monitor bioeconomic impacts and adapt policies to new risks are in place.						

Supplementary Table 8: Page 8 of the Self-assessment template.

EXTERNAL SUPPORT FOR REGIONAL BIOECONOMY						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
EXISTENCE AND ACCESSIBILITY OF EXTERNAL SUPPORT						
Citizens and businesses are aware of targeted external support measures from the EU, national or international institutions available for the regional bioeconomy (e.g., funding, technical assistance, or capacity building).						
Citizens and businesses have access to targeted external support measures from the EU, national or international institutions available for the regional bioeconomy (e.g., funding, technical assistance, or capacity building).						
STRUCTURE AND STRATEGY OF EXTERNAL SUPPORT						
External support measures are well-structured, thematically diverse, and tailored to the priorities of your region.						
EFFECTIVENESS AND SCOPE OF EXTERNAL SUPPORT						
Citizens and businesses recognize an overall positive impact of external support on the development of the regional bioeconomy.						
Citizens and businesses benefit from external support measures that reach the intended target groups and contribute to sustainable change in the region.						
SUSTAINABILITY AND CONTINUITY						
External support is ongoing and embedded in long-term partnerships and funding streams.						
External capacity-building activities contribute to lasting competencies within local institutions or stakeholders.						

Supplementary Table 9: Page 9 of the Self-assessment template.

STRATEGIC OBJECTIVES OF REGIONAL BIOECONOMY						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comment
EXISTENCE AND CLARITY OF A REGIONAL BIOECONOMY STRATEGY						
A clearly formulated regional bioeconomy strategy (or equivalent) with defined goals to regional needs exists in your region.						
The regional bioeconomy strategy includes measurable indicators and mechanisms for evaluation and adaptation.						
IMPLEMENTATION DEPTH OF STRATEGIC OBJECTIVES						
Citizens and businesses recognize the regional bioeconomy strategy as actively implemented with visible measures and results (Transformation paths (TP) serve as illustrative examples to guide the assessment).						
Citizens and businesses are aware of tangible political, financial, or regulatory efforts to support the defined regional bioeconomic goals (e.g., Subsidies for bioenergy or bio-based materials (TP1), investments in irrigation systems (TP2), promotion of biomass recycling plants (TP3), or funding programs for start-ups in the field of industrial biotechnology (TP4)).						
Existing industries, research institutions, and civil society are actively involved in the implementation of the regional bioeconomy strategy.						
POLICY INTEGRATION AND FLEXIBILITY						
The regional bioeconomy strategy is well-integrated with other policy areas such as climate, agriculture, or industry.						
The regional bioeconomy strategy is adaptable and allows for updates in response to new developments.						
TANGIBLE RESULTS AND REGIONAL IMPACT						
Citizens and businesses acknowledge the first results of the regional bioeconomy strategy (e.g., economic, ecological, or employment policy effects).						
Citizens and businesses implement innovative projects or pilot initiatives as part of the regional bioeconomy strategy (e.g., circular bioeconomy or biotechnological applications).						

TRANSFORMATION PATH 1 – Bio-Based Substitution of Fossil Fuels

Description:
Replacing fossil fuels and materials with bio-based resources.

Examples:

- Support programs or subsidies for the construction of biogas plants or wood pellet heating systems
- Tax breaks for companies that replace fossil-based materials with bio-based materials
- Regional bioenergy clusters or demonstration projects that can be experienced by citizens (e.g., local biomass heating networks)

TRANSFORMATION PATH 2 – Productivity Increase in Agriculture, Forestry and Water

Description:
Increasing productivity in bio-based sectors through innovation.

Examples:

- Advisory programs or further training for farmers on resource-efficient farming
- Investments in irrigation systems that reduce water consumption
- Programs for soil conservation and CO₂ storage in agriculture

TRANSFORMATION PATH 3 – Efficient Biomass Use and Recycling

Description:
Promoting recycling and efficient use of biomass to reduce waste.

Examples:

- Promotion of biomass recycling plants or composting at the municipal level
- Regional innovation competitions or support programs for companies that recycle waste biomass
- Laws on the separate collection of organic waste or the mandatory use of by-products in industry

TRANSFORMATION PATH 4 – Biotechnological Innovation

Description:
Applying biological principles and processes in industry for sustainable, high-value products.

Examples:

- Funding programs for start-ups in the field of synthetic biology or industrial biotechnology
- Research centers or university collaborations that develop new processes (e.g., enzymes or bio-based plastics)
- Industry networks or cluster funding that connect SMEs with universities and large companies

The project

The **RIBES** project **aims** to enhance the uptake of bio-based innovations in ten (10) European regions by developing new governance and business models that combine social entrepreneurship with rural development, thus advancing the transition to a circular economy.

Coordinator: **CENTRAL EUROPEAN INITIATIVE (CEI)**

	Central European Initiative	INCE
 Maastricht University	Maastricht University	UM
 CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS	Centre for Research and Technology Hellas	CERTH
BIOCOM	BIOCOM	BIOCOM
	White Research	WR
 UNIVERSITY OF HOHENHEIM	University of Hohenheim	UHOH
 circe Creating together	CIRCE - Centro Tecnológico	CIRCE
 Q-PLAN INTERNATIONAL	Q-PLAN International	QPL
 arx.net ARX RESEARCH	ARX.net	ARX.NET
	European Rural Development Network	ERDN
	Agricultural University Plovdiv	AUP
 MedINA MEDITERRANEAN INSTITUTE FOR NATURE AND ANTHROPOS	MedINA	MedINA
	Energy Institute Hrvoje Požar	EIHP

	SPRING	SPRING
	Lucian Blaga University of Sibiu	ULBS
	Rzeszowska Agencja Rozwoju Regionalnego S.A.	RARR
	Balkan Rural Development Network	BRDN
	Faculty of Technical Sciences University of Novi Sad	FTN
	Bioeconomy Cluster	BEC
	FORZA Agency for Sustainable Development of the Carpathian Region	FORZA

CONTACT US: info@ribesproject.eu

VISIT: ribesproject.eu

 RIBES project

 RIBES_project

 RIBES project

 RIBES-Project

CONTACT US: info@ribes.eu VISIT: www.ribes.eu

 Ribes

 @Ribes

 Ribes

 @Ribes