Article

Assessing Bioeconomy Development Opportunities in the Latvian Policy Planning Framework

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Abstract: The broad spectrum of bioresource use makes it challenging to interconnect strategic objectives and policy planning documents without compromising a coherent development vision. Bioeconomy development directions have been defined at the EU and Latvian levels. Nevertheless, to facilitate their implementation, the goals must be consistent with those specified in relevant national policy planning documents and vice versa. To determine whether internationally defined bioeconomy objectives are implemented in Latvian policy planning documents and what priority is given to them, a mixed methods approach was used—a systematic literature review combined with a keyphrase assignment approach. The results are summarized in an illustrative screening matrix and aggregated using the TOPSIS method to identify in which policy planning documents bioeconomy objectives are prioritized and to what extent. The results have shown a high prioritization of bioeconomy objectives in Latvian policy planning documents, especially in hierarchically higher documents.

Keywords: bioeconomy strategy; policy coherence; policy framework; strategic development

1. Introduction

The year 2022 marks the 10th anniversary of the first European Bioeconomy Strategy "Innovating for sustainable growth—A bioeconomy for Europe" (further EBS) [1,2]. The EBS sets out a series of objectives aimed at expanding the use of bioresources and underlining the need to move from the "old" to the "new" bioeconomy—knowledge-based and innovative [2,3]. The aim is to improve the current practices in land use and resources sustainably, to reduce emissions during resource extraction and processing, to lessen waste and use by-products to create higher value-added products, to move towards a circular economy, to minimize the use of non-renewable, unsustainable resources and adopt other environmentally friendly practices [2,3]. The bioeconomy has not lost its relevance over the last 10 years. On the contrary, global climate change, the current geopolitical situation, and rising energy prices further emphasize the need for the sustainable use of bioresources and the replacement of fossil fuels [4,5].

The economic impact of the COVID-19 pandemic and the tense geopolitical situation with the active warfare in Ukraine has created a situation where energy and food prices are rising rapidly due to disrupted and uncertain supply. The objectives of the EBS [6] are now central and could be a solution in terms of replacing fossil fuels with renewable resources under the condition of efficient and knowledge-based use of bioresources [5,7]. As the application of bioresources is wide-ranging, the EBS should be seen as a part of a larger equation, which could be solved by attaining coherence between policies affecting the bioeconomy and bioresources management at the international and the EU Member State level. Latvia is no exception. Therefore, bioeconomy development potential in Latvia should be assessed in order to identify the coherence between policy planning documents concerning different domains (external coherence) and also within each policy domain

to verify the consistency of expressed policy goals, instruments, and other policy-related signals (internal coherence) [8].

Coherent policy-making across sectors could contribute to environmental sustainability and the development of successful national and regional cooperation mechanisms for forming functional regulation mechanisms and achieving common goals [4,8]. National action plans for the governance of bioresources aligned with international targets could ease food and energy supply risks, promote more rational and efficient use of bioresources, and prevent rapid and unpredictable inflation in Latvia and across the EU [5]. It is essential to identify whether Latvia's policy planning documents are coherent regarding the internal and external policy domains of bioeconomy development opportunities [4,8,9]. Whether the implementation of the overall strategic vision of bioeconomy development is following a top-down approach and maintains coherence at all levels is therefore important to identify [10,11].

2. Materials and Methods

2.1. Systematic Literature Review

A methodology was developed to identify a framework for developing the bioeconomy in Latvia's policy planning documents (Figure 1). The authors first identified internationally important documents that outline the main bioeconomy development trends and priorities. Three documents were selected: the 2009 OECD report "The Bioeconomy to 2030. Designing a Policy Agenda" [12]; EBS (2012) [6] and the EBS Action plan "A sustainable bioeconomy for Europe. Strengthening the connection between economy, society and the environment: updated bioeconomy strategy" (2018) [13]; UN "Transforming our world: the 2030 Agenda for Sustainable Development" (2015) [14,15]. The objectives and action lines for bioeconomy development in these documents were identified through a systematic literature review (SLR). From the identified objectives, keywords were selected for further work with Latvian policy planning documents [16] to determine whether their objectives for bioeconomy development coincide with those set at the international level.
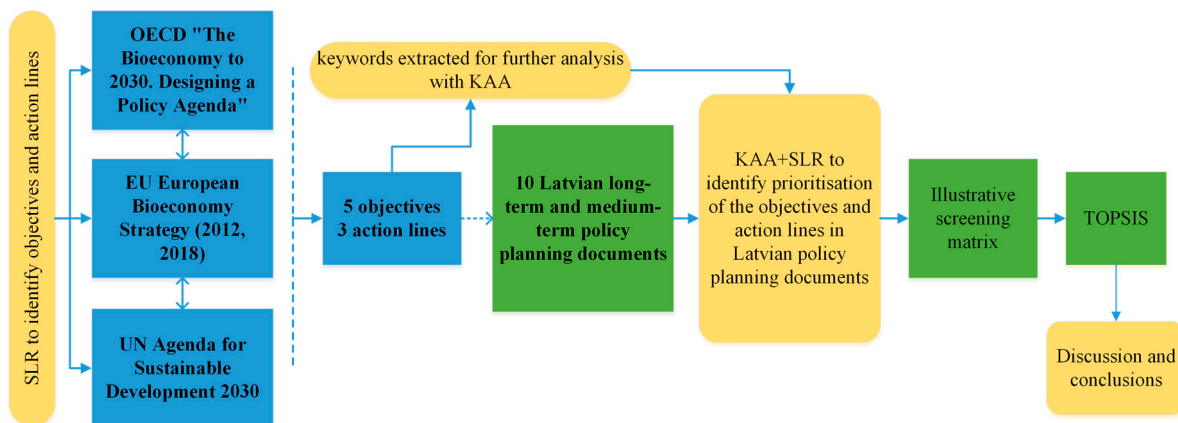
Figure 1. Methodology for assessment of policy planning documents at the international and national level.

The next step was to select Latvia's policy planning documents for further analysis. This step was also necessary to understand whether the documents coincide with the international purpose of the bioeconomy [11,17]. A total of 10 policy strategies and development plans directly related to the bioeconomy were selected (Appendix A) using a hybrid search strategy—SLR in combination with snowballing [18]. The search began with the analysis of the Latvian Bioeconomy Strategy 2030 (further LBS) and expanded the set to policy planning documents in relation to it and to the development of the bioeconomy. Further, a keyphrase/keyword assignment approach (KAA) [16,19,20] in combination with SLR was used to identify the specification of the internationally agreed objectives in the selected

Latvian policy planning documents. This would also allow for assessing the level of priority given to them. The results were presented in an illustrative screening matrix using a Likert-type scale [21], where more mentions of an objective indicated its higher priority. The priority of an objective was determined by the number of times it was mentioned in the policy planning document, as shown in Table 1.

Table 1. Rating scale for the illustrative screening matrix.

Rating	Level of Priority	Interaction
1	not a priority	no mention
2	low priority	1–2 mentions
3	medium priority	3–4 mentions
4	high priority	5–8 mentions
5	essential	9 and more mentions

The SLR has its roots in evidence-based policy and practice. It can be used to address environmental issues and evaluate policies and policy instruments [22–24]. One of the strengths of the SLR is that it allows one to answer a specific question or test a hypothesis [22,24]. Hence, the SLR method was chosen to identify international objectives and later to improve the quality of the illustrative screening matrix, showing the priority given to each of the international objectives identified above in the policy planning documents. SLR can be very time-consuming; therefore, KAA [19,20] was applied to reduce the time needed to review all 10 of Latvia's policy planning documents. The KAA was chosen because it is less time-consuming and helps to revise a document and the issue more closely while maintaining consistency [19,20]. Latvian policy planning documents range in length from 32 pages [25] to 228 pages [26], therefore, looking for pre-assigned keyphrases and keywords (Table 2) identified at the international level helped to maintain the scope and to constrain the study to a concise timeframe.

Table 2. Assigned keyphrases and keywords.

No.	Identified Objectives and Action Lines	Keyphrases and Keywords *
O_1	Ensure food and nutrition security	food security, ensure food, food availability
O_2	Manage natural resources sustainably	natural resources; sustainability; resources; natural
O_3	Reduce dependence on non-renewable, unsustainable resources	dependence; non-renewable; fossil
O_4	Limit and adapt to climate change	climate change; adaptation
O_5	Strengthen European competitiveness and create jobs	employment; jobs; promoting employment; competitiveness
A_1	Strengthen and scale up the biobased sectors, unlock investments and markets	biobased; attracting investment; innovation; investment
A_2	Deploy local bioeconomies rapidly across the whole of Europe	bioeconomy; bioresources; regions
A_3	Understand the ecological boundaries of the bioeconomy	ecological; boundaries; biological

* Keyphrases and keywords searched in documents in Latvian by using the word root.

2.2. Multi-Criteria Decision Analysis

An illustrative screening matrix was developed from the results of SLR and KAA. It shows the priority level of the international bioeconomy development goals in each of Latvia's policy planning documents. To determine which of the ten policy planning documents has the highest level of coherence with the internationally defined bioeconomy

development objectives, the authors carried out a multi-criteria decision analysis—the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS).

The advantage of the TOPSIS method is its simplicity and the relatively small amount of data required to apply it [27,28]. The TOPSIS method is used for decision-making in various areas, including the evaluation of strategies by determining the proximity of predefined alternatives to the ideal positive and negative solutions [27–29]. One component of the TOPSIS calculation is the application of weighted criteria values. The calculation is then repeated with equal weights to determine the impact of the weights on the obtained results. [28]. The calculation was performed according to the steps and formulas listed below [30–32].

$$D = \begin{array}{c} A_1 \\ \vdots \\ A_m \end{array} \begin{pmatrix} \begin{array}{ccc} C_1 & \dots & C_n \end{array} \\ \begin{pmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{pmatrix} \end{array} \tag{1}$$

where:

$A_1 \dots A_m$—comparable alternatives;

$C_1 \dots C_n$—criteria according to which the comparison is performed;

x_{ij}—performance/value of alternative A_i (where i is alternative 1 to m) according to criterion C_j (where j from 1 to n).

$$D_{\text{norm}} = \begin{array}{c} A_1 \\ \vdots \\ A_m \end{array} \begin{pmatrix} \begin{array}{ccc} C_1 & \dots & C_n \end{array} \\ \begin{pmatrix} r_{11} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mn} \end{pmatrix} \end{array} \tag{2}$$

The next step is to calculate the normalized rating using the formula:

$$r_{ij} = \frac{x_{ai}}{\sqrt{\sum_{a=1}^{n} x_{ai}^2}} \tag{3}$$

When the normalized evaluation of all alternatives according to the criteria specified in Table 2 is obtained, it is necessary to determine the individual weight w_i of each criterion. Weights are determined by meeting a condition—the sum of criterion weights is equal to 1.

Expert evaluation is used to determine the individual weight of each criterion. As criteria weights, expert evaluation was obtained by Dolge et al. [33], analyzing the national bioeconomy strategies of nine EU countries using the TOPSIS method. The identified objectives and action lines in Table 2 coincide with the evaluation criteria set out in the study by Dolge et al. [33] (EBS objectives and EBS Action plan action areas); therefore, in order to ensure continuity and comparability of the studies, it was decided to use the expert evaluation in this research as well (Table 3). The expert evaluation was obtained through an online survey of industry stakeholders involved in any of the primary bioresources production or processing sectors or in scientific research in the field of bioeconomy, climate, and environmental sustainability [33]. The experts were asked to rate each of the criteria to detect the most important ones for the rapid development of the bioeconomy [33]. The weights of the criteria are the average of the 27 experts' responses for each criterion, giving a total of 1 or 100% for all criteria [33] (Table 3). The criterion weights obtained were inserted into the TOPSIS matrix and used for further calculations. In the next step, the criteria weight values w_i obtained from the expert evaluation are multiplied by the normalized values r_{ia} to obtain the normalized weighted value v_{ai}, as shown in Equation (4):

$$v_{ai} = w_i * r_{ia} \tag{4}$$

Table 3. Expert evaluation used for criterion weights [33].

No.	Criteria	Criterion Weights, w_i
1	O_1—Ensure food and nutrition security	0.11
2	O_2—Manage natural resources sustainably	0.18
3	O_3—Reduce dependence on non-renewable, unsustainable resources	0.19
4	O_4—Limit and adapt to climate change	0.12
5	O_5—Strengthen European competitiveness and create jobs	0.10
6	A_1—Strengthen and scale up the biobased sectors, unlock investments and markets	0.13
7	A_2—Deploy local bioeconomies rapidly across the whole of Europe	0.08
8	A_3—Understand the ecological boundaries of the bioeconomy	0.09
	TOTAL:	1.00 (100%)

When the normalized weighted decision matrix is constructed, the ideal positive solution d_a^+ and the ideal negative solution d_a^- are calculated. Initially, the distance to the ideal solution (MAX) and the distance to the anti-ideal solution (MIN) are determined. Distances are determined by formulas:

$$=\mathrm{MAX}(v_{a1}{:}v_{a3}) \tag{5}$$

$$=\mathrm{MIN}(v_{a1}{:}v_{a3}) \tag{6}$$

After determining the distance to the ideal and anti-ideal solution, the next step is to determine the ideal positive and ideal negative solution according to the formulas:

$$d_a^+ = \sqrt{\sum_{j=1}^{n}\left(v_i^+ - v_{ai}\right)^2} \tag{7}$$

$$d_a^- = \sqrt{\sum_{j=1}^{n}\left(v_i^- - v_{ai}\right)^2} \tag{8}$$

The relative proximity of the alternative to the ideal solution is calculated as shown in formula No. 9:

$$C_a = \frac{d_a^-}{d_a^+ + d_a^-} \tag{9}$$

The result is equal to values that show the proximity of the alternative to the ideal positive solution and the distance from the ideal negative solution.

To determine the impact of the weights of the criteria set by the expert evaluation (Table 3) on the evaluation of criteria, a re-evaluation of the criteria is performed, assigning equal values to all alternatives by using the same equations described above.

3. Results

3.1. International Policy Framework of Bioeconomy

Three leading policy planning documents were selected for identifying internationally established directions for bioeconomy development. The 2009 OECD report "The Bioeconomy to 2030. Designing a Policy Agenda" [12] lays the foundations for a strategic view of the bioeconomy and the benefits that could arise from the wider use of bioresources and biotechnologies [15]. The report states that the bioeconomy has all the potential needed to

ensure long-term economic and environmental sustainability, however, to achieve this, a broad public and national government support is crucial [12]. The OECD report identifies nine vital challenges in the bioeconomy till 2030 [12] and they are summarized in Table 4.

Table 4. Objectives and actions identified at international level to develop bioeconomy [12] (pp. 287–293), [6,14] (pp. 9–11), [13] (pp. 10–22).

OECD "The Bioeconomy to 2030. Designing a Policy Agenda" [12]	UN Agenda for Sustainable Development 2030 [14]	European Bioeconomy Strategy (2012, 2018) [6,13]
reverse the neglect of primary production and industrial applications;	Goal 2: eradicate hunger, achieve food security and improved nutrition, and promote sustainable agriculture;	O1—ensure food and nutrition security;
prepare for a costly but beneficial revolution in healthcare;	Goal 7: ensure universal access to affordable, reliable, sustainable, and modern energy services;	O2—manage natural resources sustainably;
manage the globalization of the bioeconomy;	Goal 8: promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all;	O3—reduce dependence on non-renewable, unsustainable resources;
turn the economically disruptive power of biotechnology to advantage;		
prepare for multiple futures;	Goal 12: ensure sustainable consumption and production patterns;	O4—limit and adapt to climate change;
maximize the benefits of integration;	Goal 13: take urgent action to combat climate change and its impact;	O5—strengthen European competitiveness and create jobs
reduce barriers to biotechnology innovation;	Goal 14: preserve and sustainably use the oceans, seas, and marine resources to ensure sustainable development;	(A1)—strengthen and scale up the biobased sectors, unlock investments and markets;
create a dynamic dialogue between governments, citizens, and firms;	Goal 15: protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.	(A2)—deploy local bioeconomies rapidly across the whole of Europe;
prepare the foundation for the long-term development of the bioeconomy.		(A3) understand the ecological boundaries of the bioeconomy.

The role of the bioeconomy as a globally significant driver for future development is reinforced and complemented by the plan—"Transforming our world: the 2030 Agenda for Sustainable Development", adopted by the UN in 2015 [14]. The 17 Sustainable Development Goals (further SDGs) include a series of actions aimed not only at eradicating poverty and hunger but also at combating climate change by encouraging responsible and efficient use of resources and other environmentally friendly measures [14]. Seven of the SDGs are more closely linked to bioeconomy development and are summarized in Table 4 [14,25].

In 2012, shortly after the OECD report was published, the EU adopted its first EBS [6] to address ecological, environmental, energy, food supply, and bioresource challenges [15]. As a result, a set of five key objectives for promoting and strengthening the bioeconomy were brought forward (Table 4) [6]. The EBS was designed to complement existing EU policies such as the Common Agricultural Policy and Common Fisheries Policy and invited EU Member States to develop their own national strategies in order to place bioeconomy on their policy agenda [6].

A few years later in 2018, the existing EBS was revised, and the direction of the strategy was adjusted by adding new areas of action [2,6,13]. An updated EBS "A sustainable bioeconomy for Europe. Strengthening the connection between economy, society and the environment: updated bioeconomy strategy", and Action Plan were adopted [13]. The Action Plan identifies three action areas (Table 4), under which a total of 14 sub-activities are identified [2,13]. The EBS Action Plan (2018) is created taking into account and is closely interlinked with the SDGs [2].

The objectives and action lines summarized in Table 4 are listed in the order in which they appear in each document, without attempting to group them thematically or by importance. Table 4 shows the main goals of the documents and, as they do not show conflicting ideas, for further analysis only the objectives and action lines from the EBS and EBS Action Plan will be used in order to reduce the number of keywords to be searched for in the policy planning documents. An additional argument for the keywords being drawn

only from the EBS and EBS Action Plan is that the documents adopted by the OECD [12] and the UN [14] have been taken into account in the development of the EBS [6] and later EBS Action Plan [13].

In addition, four keywords were added as the major sources of bioresources: agriculture, forest sector, fisheries, and aquaculture. Hence, it would be possible to determine whether one of these three sectors is being developed more or, on the contrary, neglected.

On average, between 15 and 20 keywords or keyphrases in Latvian were used per policy document, with the potential to indicate the inclusion of the objectives listed in Table 4 or the three bioeconomy-related sectors in policy documents.

3.2. National Policy Framework—The Latvian Bioeconomy Strategy

The LBS was adopted in 2017 [25] in regard to Latvia's highest hierarchical long-term planning document—the Latvian Sustainable Development Strategy 2030 [34]. Latvia's Sustainable Development Strategy 2030 sets a goal "to become the EU leader in the preservation, increase, and sustainable use of natural capital" [25,34], but, to achieve this, the bioeconomy needs to be given a more important role at the national level, and possible directions for development need to be identified. Bioeconomy in Latvia encompasses many economic sectors that can be divided into several groups: primary production of bioresources (agriculture, forest sector, fisheries); processing sectors of bioresources, where operation completely or mainly depend on bioresources; processing sectors of bioresources, where bioresources compete with other raw materials or replace them; service sectors using bioresources [25].

LBS states that Latvia has ample opportunities to successfully develop the bioeconomy and use natural resources sustainably and as efficiently as possible [25]. Through the development of the bioeconomy, land resources could be used in a strategic and sustainable manner and new well-paid jobs could be created [25]. An important future development would be the reduction in waste in manufacturing and processing industries and the substitution of fossil resources for bioresources [25]. Objectives and action directions defined by the LBS are presented in Table 5 [25].

Table 5. Objectives of the Latvian Bioeconomy Strategy 2030 [25] (pp. 5–22).

Latvian Bioeconomy Strategy 2030	
Objectives	**Action Directions**
(1) promotion and preservation of employment in bioeconomy sectors to up to 128 thousand employees	Attractive Entrepreneurial Environment
(2) increasing the added value of bioeconomy products to at least 3.8 billion euros in 2030	Result-oriented Efficient and Sustainable Resource Management
(3) increasing the value of bioeconomy export production to at least 9 billion euros in 2030	Knowledge and Innovations
	Promotion of Manufacturing the Produce in Bioeconomy
	Socially Responsible and Sustainable Development

3.3. Latvian Policy Planning Documents Related to the Bioeconomy

For the analysis of Latvian policy planning documents, 10 long-term and medium-term planning documents (Appendix A) were identified by using SLR in combination with snowballing. Starting with LBS [25], then expanding the selection to the Latvian Sustainable Development Strategy 2030 [34] and documents related to waste management [26], achieving climate neutrality [35], moving towards a circular economy [36], and other thematically related policy planning documents. To determine how the bioeconomy development possibilities are covered and to what extent was prioritized by these documents.

In terms of year of adoption, the earliest document in the set is the Sustainable Development Strategy of Latvia 2030 [34], adopted in 2010, followed by the LBS [25], adopted in 2017 (Appendix A). Other policy planning documents were adopted in 2019 or earlier. Most policy documents in Appendix A set out not only the objectives to be achieved, but also specific action lines and performance indicators. Documents with actions defined in a generic manner, without specific actions, are the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35] and the LBS [25]. The Strategy of Latvia for the Achievement of Climate Neutrality by 2050 and LBS are the only policy planning documents in the selection of documents that are "informative reports" and do not have action plans. LBS does not set qualitative or quantitative indicators to measure the achievement of the objectives [25]. An important element in achieving objectives set out in policy planning documents is an interim evaluation to monitor the progress of the implementation. Sustainable Development Strategy of Latvia 2030 [34]; Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35]; Latvian National Development Plan 2021–2027 [37] and National Energy and Climate Plan for 2021–2030 [38] have incorporated a periodic or mid-term evaluation. Documents that do not include a mid-term assessment are the LBS [25]; Action Plan for the Transition to a Circular Economy 2020–2027 [36], and Environmental Policy Guidelines 2021–2027 [39].

Half of the revised policy planning documents do not have indicative funding for implementation. In addition, the LBS has no indication of the approximate amount or possible sources of funding for the promotion and development of the bioeconomy [25]. Regarding the source of funding, some of the policy planning documents (Appendix A) include a statement that the action lines will be implemented within the existing national budget, putting a particular emphasis on the possibility to attract funding from the EU Structural Funds, as well as other sources of funding, including private finance.

3.4. Implementation of International Objectives in Latvia's Policy Planning Documents
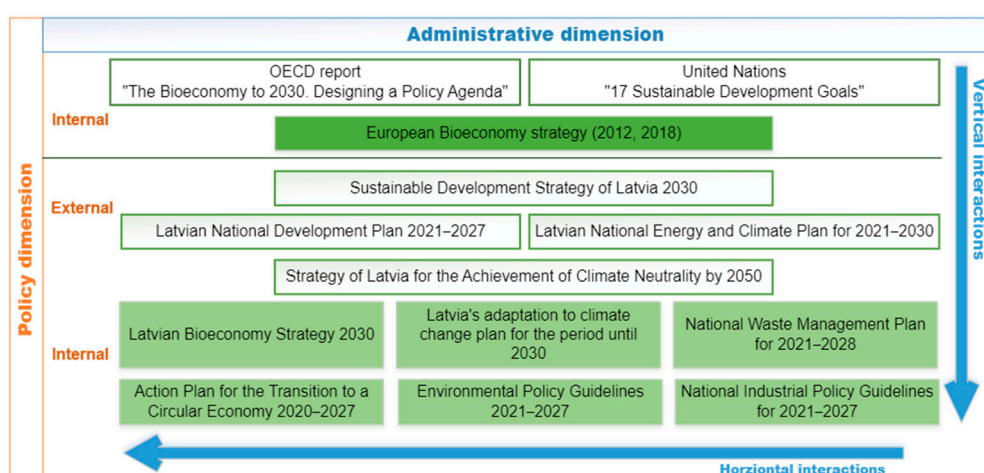
3.4.1. Illustrative Screening Matrix

The results obtained with KAA and SLR on the prioritization of bioeconomy development goals in Latvian policy planning documents were normalized according to Table 1. Acquired ratings were displayed in the illustrative screening matrix (Table 6). The matrix does not analyze the nature of interactions but looks at the priority of objectives (Table 4) in Latvian policy planning documents by counting mentioned keyphrases and keywords in the context of bioeconomy objectives. The assumption is that the more often an objective or action line is mentioned in a policy document, the higher the priority is given to it and the more likely it is to be implemented.

The illustrative screening matrix (Table 6) not only allows one to assess the priorities set in Latvian policy planning documents in relation to internationally defined objectives and action lines but also allows one to estimate the internal and external coherence between different policy domains (Figure 2) [8]. Additionally, vertical interactions can be observed—whether international-level documents are implemented on a national level, and on lower-level planning documents related to the bioeconomy sector [8]. Horizontal interactions show whether there is synergy between the objectives set out on international and local level policy planning documents across external and internal dimensions [8].

Table 6. Illustrative screening matrix.

Long-Term and Medium-Term Planning Documents	Bioeconomy-Related Objectives and Action Lines Stated in European Bioeconomy Strategy (2012, 2018) (Table 4)										Rating Per Document	Agriculture	Forest Sector	Fisheries, Aquaculture	Sum for Sectors
	O1	O2	O3	O4	O5	Sum O	(A1)	(A2)	(A3)	Sum A					
Sustainable Development Strategy of Latvia until 2030 [34]	4	5	2	5	5	21	4	3	5	12		5	2	3	10
Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35]	4	5	5	5	5	24	5	4	4	13		5	4	2	11
Latvian National Development Plan 2021–2027 [37]	3	5	2	5	5	20	5	5	4	14		2	2	2	6
Latvian National Energy and Climate Plan for 2021–2030 [38]	2	3	3	5	4	17	4	3	1	8		4	4	2	10
Latvian Bioeconomy Strategy 2030 [25]	5	5	5	4	5	24	5	5	3	13		5	5	5	15
Latvia's Adaptation to Climate Change Plan for the Period Until 2030 [40]	2	3	2	5	3	15	2	1	3	6		5	4	4	13
National Waste Management Plan for 2021–2028 [26]	2	5	3	4	1	15	4	1	1	6		2	2	1	5
National Industrial Policy Guidelines for 2021–2027 [41]	3	3	1	5	5	17	5	5	4	14		4	3	1	8
Action Plan for the Transition to a Circular Economy 2020–2027 [36]	3	5	1	1	3	13	5	3	3	11		3	1	1	5
Environmental Policy Guidelines 2021–2027 [39]	1	5	1	5	1	13	2	4	5	11		5	3	2	10
Rating per objectives and action lines	29	44	25	44	37		41	34	33			40	30	23	

Figure 2. Coherence amongst bioeconomy-related international and national policy planning documents (adapted from [8]).

The illustrative screening matrix indicates that Latvia's long-term and medium-term policy planning documents, in general, prioritize the same objectives and action lines that have been set at the international level by the EU, UN, and OECD. Highest-level policy planning documents such as the Sustainable Development Strategy of Latvia until 2030 [34],

Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35], Latvian National Development Plan [37], Latvian National Energy and Climate Plan for 2021–2030 [38], and the LBS [25] give high priority to the international bioeconomy objectives. However, it was already expected for the LBS to score the highest out of the set of documents considered because the LBS itself mentions that it has been designed taking into account the objectives set by the EBS [25]. A lower level of prioritization can be observed in policy documents that define strategic development in more specific areas such as waste management [26], circular economy [36], and adaptation to climate change [40], because of having more specific deliverables but on average showing high results in the overall policy framework for bioeconomy development.

The results obtained by adding up the objectives (O1–O5), action lines (A1,A2), and bioeconomy sectors (agriculture, forest sector, fisheries, and aquaculture) were assessed separately in the illustrative screening matrix (see Table 6). This allowed us to assess the inclusion of the internationally agreed objectives in Latvia's policy planning documents, as well as to identify whether the EBS Action Plan adopted in 2018 is taken into account. The priority given to bioeconomy sectors in each of the documents was also assessed, thus showing which of them is being prioritized.

The evaluation of the policy planning documents (Table 6) by adding up the objectives (O1–O5) showed that the LBS [25] and the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35] have the highest ranking with 24 points. The following documents are next in order of points—the Sustainable Development Strategy of Latvia until 2030 [34] with 21 points, the Latvian National Development Plan 2021–2027 [37] with 20 points, and close behind with 17 points the Latvian National Energy and Climate Plan for 2021–2030 [38], and the National Industrial Policy Guidelines for 2021–2027 [41]. Latvia's Adaptation to Climate Change Plan for the Period Until 2030 [40] and the National Waste Management Plan for 2021–2028 [26] obtained 15 points each. The lowest scores are shown by the Action Plan for the Transition to a Circular Economy 2020–2027 [36] (13 points) and the Environmental Policy Guidelines 2021–2027 [39] (13 points).

The analysis of the inclusion of action lines from the EBS Action Plan (A1–A3) in policy documents showed that none of the documents scored the highest possible score of 15, but both the Latvian National Development Plan 2021–2027 [37] and the National Industrial Policy Guidelines for 2021–2027 [41] scored close with 14 points each. Two policy documents scored highly, with 13 points the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35] and the LBS [25]. The Sustainable Development Strategy of Latvia until 2030 [34] obtained 12 points, and both the Action Plan for the Transition to a Circular Economy 2020–2027 [36] and the Environmental Policy Guidelines 2021–2027 [39] scored 11 points. Policy documents with the lowest scores were the Latvian National Energy and Climate Plan for 2021–2030 [38] (8 points), Latvia's Adaptation to Climate Change Plan for the Period Until 2030 [40] (6 points), and the National Waste Management Plan for 2021–2028 [26] (6 points).

The score per sector (agriculture, forest sector, fisheries, and aquaculture) in policy planning documents shows a bit of a different breakdown. The LBS [25] obtained the maximum score of 15 points. The next highest score is reached by Latvia's Adaptation to Climate Change Plan for the Period Until 2030 [40] (13 points), and the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35] (11 points). The Sustainable Development Strategy of Latvia [34], the Latvian National Energy and Climate Plan for 2021–2030 [38], and the Environmental Policy Guidelines 2021–2027 [39] have the same score of 10 points. Other policy planning documents have scored less—the National Industrial Policy Guidelines for 2021–2027 [41] (8 points), the Latvian National Development Plan 2021–2027 [37] (6 points), the National Waste Management Plan for 2021–2028 [26], and the Action Plan for the Transition to a Circular Economy 2020–2027 [36] (5 points).

Despite the fact that the EBS was taken into account in the development of the LBS [25], it has not received the highest possible scores, although it shows the greatest consistency with the internationally defined objectives (O1–O5) and action lines (A1–A3). It should

be noted that the LBS scored highest in the bioeconomy sectoral assessment, giving equal priority to all three sectors. Comparatively higher scores in the objective assessment were achieved by higher level policy planning documents as well as the National Industrial Policy Guidelines for 2021–2027 [41], which can be considered a positive trend as it shows that internationally defined bioeconomy development objectives are being taken into account. The presence of the National Industrial Policy Guidelines among the highest scoring documents should be seen as a logical outcome, as a knowledge-based innovative bioeconomy is one of the five knowledge areas (RIS3) identified for Latvia and discussed in more detail in the document [41].

The assessment of the implementation of the actions (*A*1–*A*3) of the EBS Action Plan in policy planning documents has shown similar results, with the National Industrial Policy Guidelines [41] scoring second highest. The Latvian National Energy and Climate Plan for 2021–2030 [38] scored relatively low compared to other hierarchically higher documents, possibly due to its thematic focus on energy and energy efficiency issues, with less attention to ecological boundaries. The bioeconomy sectors (agriculture, forest sector, fisheries, and aquaculture) have received varying attention in the policy planning documents reviewed. As already mentioned, the LBS has given equal priority to all sectors. No clear correlation can be discerned between the prioritization of bioresource extraction sectors in higher and lower-level policy planning documents.

Looking at the priority areas assigned to the objectives related to the development of the bioeconomy in the policy planning documents (Table 6—*O*1–*O*5, (*A*1)–(*A*3) vertically) the results indicate that in Latvian policy documents, priority is given to *O*2—"manage natural resources sustainably" (44 points) and *O*4—"limit and adapt to climate change" (44 points). Slightly lower scores are received by (*A*1)—"strengthen and scale up the biobased sectors, unlock investments and markets" (41 points) and *O*5—"strengthen European competitiveness and create jobs" (37 points); (*A*2)—"deploy local bioeconomies rapidly across the whole of Europe" (34 points) and (*A*3)—"understand the ecological boundaries of the bioeconomy" (33 points). The lowest priority was given to objectives *O*1—"ensure food and nutrition security" (29 points) and *O*3—"reduce dependence on non-renewable, unsustainable resources" (25 points).

The priority given to the agriculture, forest sector, fisheries, and aquaculture sectors in Latvia's policy planning documents altogether was assessed to determine whether any bioresource sector is prioritized over others. The assessment shows that the highest priority in the context of the bioeconomy is given to developing the agricultural sector (40 points); the forest sector scores lower with 30 points and the least priority is given to developing fisheries and aquaculture with 23 points.

3.4.2. TOPSIS Results

The TOPSIS criteria were weighted according to expert evaluation [33] (Table 3). The experts determined which of the criteria (Table 2) could play a crucial role in the development of the bioeconomy in Latvia. Thus, the TOPSIS analysis results would reveal which of Latvia's policy planning documents puts the most emphasis on a particular objective.

Therefore, the prioritized bioeconomy development objectives in the policy planning document combined with expert evaluation (Table 3), identifying which of these objectives are most important, were the ideal positive solution. In the evaluation of the Latvian policy planning documents using the TOPSIS method, with criteria weights (Table 3), the LBS [25] (0.98), and the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35] (0.98) have the highest score and are the closest to the ideal positive solution for bioeconomy development in Latvia (Figure 3). The Sustainable Development Strategy of Latvia 2030 [34] with 0.58 points and the Latvian National Development Plan 2021–2027 [37] with 0.57 points scored significantly lower; the next closest to the ideal solution was the Latvian National Energy and Climate Plan for 2021–2030 [38] with 0.46 points. The next highest scorers are policy planning documents aimed at developing a specific policy area or

sector—the National Waste Management Plan for 2021–2028 [26] (0.38 points); the National Industrial Policy Guidelines for 2021–2027 [41] (0.37 points); and the Environmental Policy Guidelines 2021–2027 [39] (0.23 points). Latvia's Adaptation to Climate Change Plan for The Period Until 2030 [40] and the Action Plan for the Transition to a Circular Economy 2020–2027 [36] received only 0.22 points.
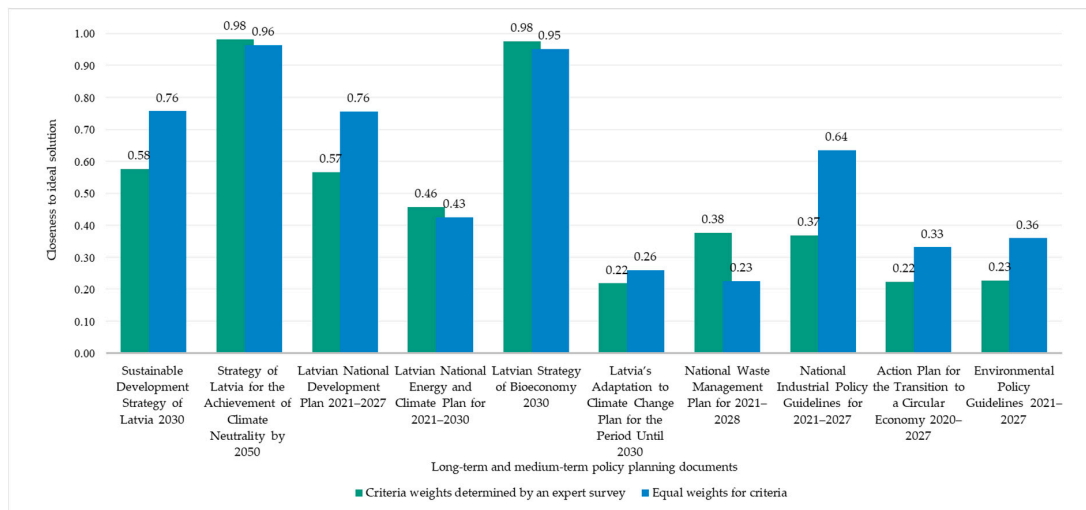
Figure 3. TOPSIS results on prioritized objectives and action lines in the Latvian policy planning documents.

TOPSIS results with applied equal criteria weights show similar results as when applying the criteria weights determined by experts. The policy planning documents closest to the ideal positive solution are the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35] (0.96) and the LBS [25] (0.95) (Figure 3). The Sustainable Development Strategy of Latvia 2030 [34] with 0.76 points and the Latvian National Development Plan 2021–2027 [37] with 0.76 points scored significantly higher than in the evaluation with criteria weights set by experts, however, these two documents maintain the third and fourth highest ranking. The National Industrial Policy Guidelines for 2021–2027 [41] showed a better result with equal criteria weights by scoring 26 points higher than in the evaluation with criteria weights determined by expert evaluation (0.64 points). The Latvian National Energy and Climate Plan for 2021–2030 [38] with 0.43 points has almost a similar score as in the previous assessment with weights assigned by experts. Farther from the positive ideal solution are the Environmental Policy Guidelines 2021–2027 [39] (0.36 points), the Action Plan for the Transition to a Circular Economy 2020–2027 [36] with 0.33 points, Latvia's Adaptation to Climate Change Plan for the Period Until 2030 [40] with 0.26 points, and National Waste Management Plan for 2021–2028 [26] with 0.23 points.

The TOPSIS analysis on agriculture, forest sector, and fisheries and aquaculture in Latvian policy planning documents (Figure 4), with equal criteria weights, has shown the following results. One document is the ideal positive solution with 1.00 point—the LBS [25]. Latvia's Adaptation to Climate Change Plan for the Period Until 2030 [40] is the second closest with 0.92 points. Other policy planning documents scored lower in the TOPSIS assessment. The third document that is the closest to the ideal positive solution is the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35] (0.52). The fourth is the Latvian National Energy and Climate Plan for 2021–2030 [38] (0.46), and the fifth is the Sustainable Development Strategy of Latvia 2030 [34] (0.45). The Environmental Policy Guidelines 2021–2027 ranked close to this score [39] (0.38). The National Industrial Policy Guidelines for 2021–2027 [41] obtained 0.18 points, the Latvian National Development Plan 2021–2027 [37] 0.08 points, and the National Waste Management Plan for 2021–2028 [26] with 0.03, and the Action Plan for the Transition to a Circular Economy 2020–2027 [36] with 0.01 are the furthest away from the ideal positive solution.
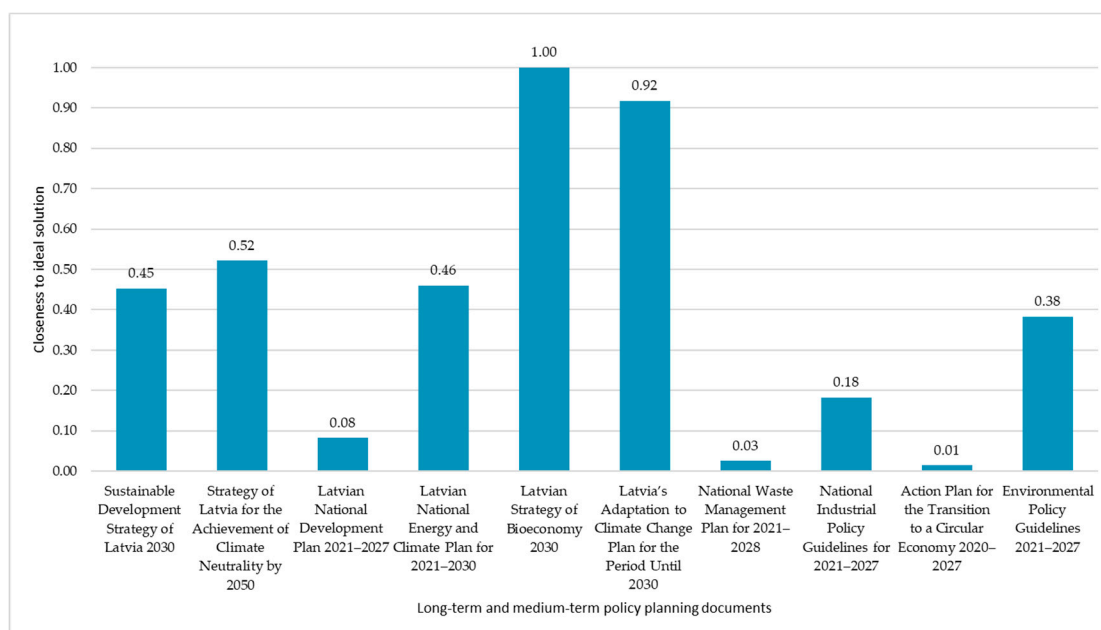
Figure 4. TOPSIS results on agriculture, forest sector, fisheries, and aquaculture.

4. Discussion

The results of the analysis of Latvia's long-term and medium-term policy planning documents by constructing an illustrative screening matrix and a subsequent analysis with TOPSIS indicate a positive trend in the implementation and prioritization of the internationally agreed objectives in Latvia's policy planning. Each of the 10 documents selected for the study could be linked to the international objectives. Notably, the policy planning documents that are higher up the policy planning hierarchy, such as the Sustainable Development Strategy of Latvia until 2030 [34], the Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35], and the Latvian National Development Plan 2021–2027 [37] performed considerably better than specifically targeted lower-level sectoral plans, as for example the Environmental Policy Guidelines 2021–2027 [39].

Looking at the priority given to each objective and action line in the Latvian policy planning documents, a less thematic elaboration on the objective of $O1$—"ensure food and nutrition security" [6] and $O3$—"reduce dependence on non-renewable, unsustainable resources" can be observed [6]. Food and nutrition safety and food quality are not seen as an issue in Latvia's policy planning, because of a well-developed agricultural sector that is fully capable of meeting current food demand and high EU quality standards [42]. Consequently, it is not considered to be a topical issue that calls for strategic planning at the national level. References to objective $O1$ are found in all the policy planning documents analyzed (Table 6), apart from the Environmental Policy Guidelines 2021–2027 [31].

Despite the negative environmental impact of fossil fuels identified in policy planning documents [26,34,35], there are no concrete actions outlined to phase out fossil fuels. The low priority given to the need to reduce dependence on non-renewable and unsustainable resources ($O3$) could be an indication of the resistance of policymakers to fossil fuel divestment, given the existing infrastructure of fossil energy sources and the year's long low prices of natural gas and oil. This scenario changed rapidly this year.

The development of agriculture and forest sectors was mentioned relatively frequently, whereas the development of fisheries, except for the LBS, received very little attention. Latvia is a water-rich country with a long maritime border, which makes it unclear why fisheries and aquaculture development is given such a low priority in planning documents. The authors suggest that this may be because Latvia's fisheries and aquaculture sectors have historically been based on fishing in the sea [43,44], but the collapse of the Soviet Union and in later years the introduction of EU fishing quotas due to the depletion of significant fish

species has led to a stagnation in the development of the fisheries sector [45,46]. However, innovative technologies and a shift towards growing fish and other marine organisms in aquacultures could change the situation [47,48]. The efficient management and use of inland waters and fish, shellfish, and algae these waters contain could be used to produce innovative products [47,48].

Assessment of the Latvian policy planning documents from a technical perspective showed that most of them set specific actions to be taken, and indicators and interim evaluations to track progress (Appendix A). Nevertheless, a critical element for all the policy planning documents is the unclear financing mechanism. The documents mostly indicate that financial resources should be allocated within the existing national budget on an annual basis or applied for from EU Structural Funds or private funding to implement the measures. This raises concerns about the extent to which the objectives and action lines for bioeconomy development could be implemented.

5. Conclusions

The methodology developed in this study allows relatively quick and easy identification of any pre-defined objectives and actions set out in policy documents. It also allows for assessing the level of priority given to such objectives and actions. However, rather than stand-alone research, this methodology can be recommended as a first step in a more in-depth examination of policy planning documents to determine the level of bioeconomy development priorities in them. It can be applied as a valuable help to facilitate the evaluation of a larger set of documents. The main drawback of this methodology is its inability to provide an assessment of direct contradictions that may exist between the elaboration of the objectives and/or the document itself. For a more detailed in-depth study, the documents with the highest or lowest scores determined using this methodology should be selected, depending on the expected outcome.

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Appendix A

Table A1. Latvian policy planning documents linked to bioeconomy.

National Policy Planning Documents Related to Bioeconomy	Information about the Document					
	Year	Action Lines to Achieve Objectives	Performance Indicators	Interim Evaluation	Funding Needed	Source of Financial Resources
Sustainable Development Strategy of Latvia 2030 [34]	2010	Specific	Qualitative and quantitative	Yes (every 2 years)	No information	Under available national budget, EU funds, private

Table A1. *Cont.*

National Policy Planning Documents Related to Bioeconomy	Information about the Document					
	Year	Action Lines to Achieve Objectives	Performance Indicators	Interim Evaluation	Funding Needed	Source of Financial Resources
Strategy of Latvia for the Achievement of Climate Neutrality by 2050 [35]	2019	Generic	Qualitative and quantitative	Yes (every 10 years)	Yes	Under available national budget, EU funds, private
Latvian National Development Plan 2021–2027 [37]	2020	Specific	Qualitative and quantitative	Yes (every 2 years)	Yes	Under available national budget, EU funds, private
Latvian National Energy and Climate Plan for 2021–2030 [38]	2020	Specific	Qualitative and quantitative	Yes	Yes	Under available national budget, EU funds, private
Latvian Bioeconomy Strategy 2030 [25]	2017	Generic	Generic	No	No information	Not specified
Latvia's Adaptation to Climate Change Plan for the Period Until 2030 [40]	2019	Specific	Qualitative and quantitative	Yes (mid-term)	Not specified	Under available national budget, EU funds, private
National Waste Management Plan for 2021–2028 [26]	2021	Specific	Qualitative and quantitative	Yes (mid-term)	Yes	Under available national budget, EU funds, private
National Industrial Policy Guidelines for 2021–2027 [41]	2021	Specific	Qualitative and quantitative	Yes (mid-term)	Yes	Under available national budget, EU funds, private
Action Plan for the Transition to a Circular Economy 2020–2027 [36]	2020	Specific	Qualitative and quantitative	No	Not specified	Under available national budget, EU funds, private
Environmental Policy Guidelines 2021–2027 [39]	2021	Specific	Qualitative and quantitative	No	Not specified	Under available national budget, EU funds, private

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