Ref. Ares(2026)7832728 - 12/08/2026

HORIZON-WIDERA-2023-ACCESS-03

BIOECONOMY EXCELLENCE ALLIANCE FOR STIMULATING INNOVATIVE AND INCLUSIVE GREEN TRANSITION

BEAMING

D6.1
Collection of individual Bioeconomy Research Action Plans

Lead Contractor: BME

Authors: Susi Susanti, Anikó Fehér, Balázs Imre

Date: 12/08/2026

This document corresponds to Deliverable D6.1 of the BEAMING project (Grant Agreement No. 101137131), produced within the framework of Work Package 6, coordinated by BME. It presents the collection of individual Bioeconomy Research Action Plans developed for each participating higher education institution (HEI).

Project details			
Project acronym	BEAMING	**Start/ Duration**	1 January 2024 /48 Months
Topic	HORIZON-WIDERA-2023-ACCESS-03-01	**Call identifier**	HORIZON-WIDERA-2023-ACCESS-03
Type of Action	HORIZON-CSA	**Coordinator**	BME
Contact persons	Balázs Imre (imre.balazs@edu.bme.hu) Anikó Fehér (feher.aniko@vbk.bme.hu)		
Website	beamingproject.eu		

Deliverable details			
Number	**D6.1**		
Title	Collection of individual Bioeconomy Research Action Plans		
Work Package	WP6 - Boosting cooperation in bioeconomy research		
Dissemination level	PU - Public	**Nature**	R — Document, report
Due date (M)	27	**Submission date (M)**	32
Deliverable responsible	1. BME	Contact person	Balázs Imre

Deliverable Contributors				
	Name	**Org.**	**Role / Title**	**E-mail**
Deliverable leader	Balazs Imre	BME	COO	imre.balazs@edu.bme.hu
Contributing Authors	Susi Susanti	BME	COO	susi.susanti@edu.bme.hu
	Anikó Fehér	BME	COO	feher.aniko@vbk.bme.hu
Reviewers	Simonida Vukadinovic	EDU	BEN	simonida.ukadinovic@educons.edu.rs
	Elisabeth Gerhardt	BOKU	BEN	elisabeth.gerhardt@boku.ac.at
Final review and quality approval	Balazs Imre	BME	COO	imre.balazs@edu.bme.hu
	Anikó Fehér	BME	COO	feher.aniko@vbk.bme.hu

Document History			
Date	**Version**	**Name**	Changes
03/06/2026	**0.1**	DRAFT	1st draft based on expert workshops, AHP
31/07/2026	**1.0**	1st version	complete version sent to reviewers
04/08/2026	**1.1**	2nd version	updated based on reviewers' comments
12/08/2026	**2.0**	FINAL	Reviewed and finalized by coordinator

TABLE OF CONTENTS

1. Acronyms and Abbreviations 6

2. Executive summary 7

3. Introduction 9

4. Objectives 12

5. Methodological Framework 13

5.1 Tools and Methods Used 13

5.2 Data Collection 17

6. Needs Assessment 19

6.1 Expert Workshop 19

6.2 AHP Survey 26

6.3 Survey analysis 29

7. Action Plan development 37

7.1 Action Plan template 37

7.2 Online Validation Workshop 38

8. Institutional Action Plan 40

9. Conclusions 42

10. References 44

Annex I – AHP survey 45

Annex II – Expert Workshop Reports 68

AUP Expert Workshop Report 68

BME Expert Workshop Report 83

EDU Expert Workshop Report 95

UKIM Expert Workshop Report 106

UNIBL Expert Workshop Report 118

UNIOS Expert Workshop Report 133

UNSFA Expert Workshop Report 147

UP Expert Workshop Report 165
AUT Expert Workshop Report 179
Annex III - AHP Results Analysis 187
AUP AHP Results 187
BME AHP Results 192
EDU AHP Result 197
UKIM AHP Results 201
UNIBL AHP Results 205
UNIOS AHP Results 209
UNSFA AHP Results 213
UP AHP Results 217
AUT AHP Results 221
Annex IV – Validation Workshop Report and Institutional Action Plans 225
AUP Validation Workshop Report and Action Plans 225
BME Validation Workshop Report and Action Plans 241
EDU Validation Workshop Report and Action Plans 251
UKIM Validation Workshop Report and Action Plans 261
UNIBL Validation Workshop Report and Action Plans 274
UNIOS Validation Workshop Report and Action Plans 281
UNSFA Validation Workshop Report and Action Plans 297
UP Validation Workshop Report and Action Plans 315
AUT Validation Workshop Report and Action Plans 324

1. Acronyms and Abbreviations

Acronyms	Explanation
AHP	Analytic Hierarchy Process
AUP	Agricultural University - Plovdiv
AUT	Agricultural University of Tirana
BEAMING	Bioeconomy Excellence Alliance for Stimulating Innovative and Inclusive Green Transition
BME	Budapesti Muszaki és Gazdasagtudomanyi Egyetem
CR	Consistency Ratio
EDU	Educons University
GMM	Geometric Mean Method
HEI	Higher education institution
NGO	Non-Governmental Organisation
R&I	Research and Innovation
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
SWOT	Strengths, Weaknesses, Opportunities, Threats
UKIM	Ss. Cyril and Methodius University in Skopje
UNIBL	University of Banja Luka
UNIOS	University of Osijek, Faculty of Food Technology Osijek
UNSFA	University of Novi Sad, Faculty of Agriculture
UP	University of Pannonia
QH	Quadruple Helix

2. Executive summary

This report corresponds to Deliverable D6.1 of the BEAMING project and was prepared under Task *T6.1 - Developing individual Bioeconomy Research Action Plans for BEAMING partners*, aimed at translating the findings of the institutional assessments conducted in Tasks T5.2–T5.3 into actionable strategies for strengthening bioeconomy research and innovation within the BEAMING HEI partners. The task focused on supporting institutional transformation by **developing individual Bioeconomy Research Action Plans** that address identified needs, challenges, and opportunities within each institution's local Quadruple Helix (QH) ecosystem.

To achieve this objective, **local Expert Workshops** were organised by nine HEI partners, involving representatives from academia, industry, government, and civil society. The workshops provided a structured platform for gathering stakeholder insights and facilitated discussions on the institutional role in the bioeconomy, **SWOT** analyses, development of **SMART** goals (**see page 13**), and identification of potential actions to strengthen bioeconomy research capacity and impact. The insights and outcomes from these consultations subsequently informed the prioritisation and development of the institutional Bioeconomy Research Action Plans, together with the evidence-based recommendations generated through the AHP survey.

To complement the qualitative stakeholder consultations, an **Analytic Hierarchy Process (AHP)** survey was conducted across the nine HEI partners. The AHP methodology enabled a structured and transparent prioritisation of proposed action plans based on seven strategic criteria: innovation and investment scale-up, sustainable biomass use and circularity integration, environmental and climate contribution, economic impact and competitiveness, interdisciplinary collaboration, skills development, and researcher career support. Survey responses were aggregated at the institutional level and analysed using standard

AHP procedures, including consistency assessment and calculation of local and global priorities.

The analysis revealed both common and institution-specific priorities across the consortium. While environmental sustainability, circularity, interdisciplinary collaboration, and researcher support emerged as recurring themes, individual institutions demonstrated distinct strategic orientations reflecting their local contexts, capacities, and development needs. The prioritisation results provided evidence-based rankings of proposed actions and supported the implementation priorities.

Importantly, the AHP results were not used as a standalone decision-making tool but were integrated with the SMART goals generated during the Expert Workshops. This combined approach ensured that the resulting action plans reflected both institutional strategic ambitions and the practical perspectives of stakeholders. Based on these inputs, each BEAMING partner developed its own institutional Bioeconomy Research Action Plan, tailored to its specific priorities and strategic objectives. The draft action plans were subsequently reviewed during an **online validation workshop**, where institutional decision-makers provided feedback and **validated the priorities and proposed actions,** ensuring their relevance, feasibility, and alignment with institutional goals.

Overall, Task T6.1 successfully achieved its objectives by supporting the development of institution-specific Bioeconomy Research Action Plans across the BEAMING HEI partners. As a result, the task delivered a robust framework for strengthening bioeconomy research capacity, fostering collaboration, and enhancing the long-term impact of participating institutions.

3. Introduction

The transition toward a sustainable and circular bioeconomy has become a strategic priority in European and global policy agendas in response to major societal challenges, including climate change, resource depletion, biodiversity loss, food security, and the broader push to move away from fossil fuels. The bioeconomy promotes the sustainable production, utilisation, and valorisation of biological resources to generate food, materials, energy, and ecosystem services while reducing dependency on fossil-based systems (European Commission, 2025).

Within the European Union, the bioeconomy is increasingly recognised as a key driver for achieving the objectives of climate neutrality, sustainable competitiveness, circular economy transformation, and regional resilience. The newly released *Strategic Framework for a Competitive and Sustainable EU Bioeconomy* highlights the importance of strengthening research and innovation, fostering cross-sectoral collaboration, accelerating circular bio-based solutions, and enhancing regional bioeconomy ecosystems to support Europe's sustainable transition (European Commission, 2025).

Higher education institutions (HEIs) play a central role within bioeconomy ecosystems through their contributions to scientific research, innovation generation, knowledge transfer, education, skills development, and stakeholder engagement. Universities are increasingly expected not only to produce scientific outputs but also to contribute directly to societal and economic transformation through interdisciplinary collaboration and innovation-oriented activities. In the context of bioeconomy development, HEIs act as critical facilitators connecting academia, industry, government, and society within the Quadruple Helix (QH) innovation model (Carayannis & Campbell, 2009; Etzkowitz & Leydesdorff, 2000).

However, many HEIs still face institutional challenges in fully supporting impactful bioeconomy research and innovation. These challenges may include fragmented interdisciplinary collaboration, limited stakeholder engagement, insufficient institutional support structures, limited commercialisation mechanisms, gaps in skills development, and the absence of integrated institutional strategies for bioeconomy research. Addressing these challenges requires institutional reflection, stakeholder involvement, and strategic planning mechanisms tailored to the specific needs and capacities of each institution (Lewandowski, 2018).

Within this context, the BEAMING project aims to strengthen bioeconomy excellence and innovation capacity among partner higher education institutions by supporting institutional transformation, interdisciplinary cooperation, and strategic engagement with regional ecosystems. Task T6.1 specifically contributes to this objective by translating the findings from the institutional assessment activities conducted in Tasks T5.2–T5.3 into actionable institutional strategies and implementation pathways.

The task focuses on improving institutional regulatory frameworks, operational procedures, and institutional practices that support bioeconomy research with tangible societal, and economic impact. To achieve this objective, partner institutions organised Expert Workshops involving Quadruple Helix stakeholders to discuss institutional bioeconomy roles, identify challenges and opportunities, conduct SWOT analyses, and formulate SMART goals for institutional development.

To complement the qualitative stakeholder engagement process, the AHP methodology was applied as a structured multi-criteria decision-making tool for prioritising institutional action plans. The integration of stakeholder feedback into the SMART goals and AHP prioritisation results provides a robust, evidence-based foundation for developing institutional Bioeconomy Research Action Plans tailored to the needs and strategic priorities of each partner institution.

The resulting action plans are intended to support institutional capacity building, strengthen collaboration within local bioeconomy ecosystems, improve institutional support mechanisms, and enhance the environmental, societal, and economic impact of bioeconomy research activities across the BEAMING consortium.

4. Objectives

The overall objective of Task T6.1 was to support BEAMING partner institutions in translating assessment findings and stakeholder input into structured and actionable institutional Bioeconomy Research Action Plans.

The specific objectives of the task were:

1. To translate the findings from Tasks T5.2–T5.3 into actionable institutional strategic priorities;
2. To support improvements in institutional regulatory frameworks, operational procedures, and practices related to bioeconomy research;
3. To conceptualise the mission and role of each HEI partner within its local Quadruple Helix ecosystem;
4. To engage Quadruple Helix stakeholders in participatory discussions related to institutional bioeconomy development;
5. To identify institutional strengths, weaknesses, opportunities, and threats through SWOT analysis;
6. To support the development of institutional SMART goals related to bioeconomy research and innovation;
7. To apply the AHP methodology for systematic prioritisation of proposed institutional actions;
8. To develop evidence-based and institution-specific Bioeconomy Research Action Plans tailored to institutional capacities, challenges, and strategic ambitions;
9. To support stakeholder validation and institutional ownership of the proposed action plans.

5. Methodological Framework

The methodology employed a participatory, mixed-methods framework that combined qualitative stakeholder engagement activities with quantitative multi-criteria decision analysis.

The methodological approach was designed to ensure that the resulting institutional action plans are:

- evidence-based,
- strategically relevant,
- participatory,
- institution-specific,
- and aligned with stakeholder expectations.

The implementation framework consisted of the following main phases:

1. Organisation of local Expert Workshops involving Quadruple Helix stakeholders through the BEAMING CoP to develop institutional SMART goals;
2. Distribution and implementation of the AHP survey;
3. AHP prioritisation analysis and consistency assessment;
4. Development of institutional Bioeconomy Research Action Plans;
5. Validation and communication of action plans with institutional decision makers.

The combination of stakeholder participation and structured prioritisation enabled partner institutions to align institutional ambitions with realistic implementation priorities.

5.1 Tools and Methods Used

Several complementary tools and methods were applied during Task T6.1 to support institutional needs assessment, stakeholder engagement, and strategic prioritisation.

1. Expert Workshops

Nine local Expert Workshops were organised by the HEI partners with participation from Quadruple Helix stakeholders, including representatives from academia, industry, public authorities, and civil society. The workshops served as participatory platforms for discussing institutional bioeconomy roles, challenges, opportunities, and strategic directions.

2. SWOT Analysis

SWOT analysis was conducted during the workshops to identify institutional **strengths**, **weaknesses**, **opportunities**, and **threats** related to bioeconomy research and innovation development.

3. TOWS Framework

This step aims to transform key insights from the SWOT analysis into focused strategic directions. Participants collaboratively identify how to leverage strengths, address weaknesses, seize opportunities, and mitigate threats. The TOWS framework uses a pairing method to move from SWOT analysis (descriptive) to strategy formulation (prescriptive).

Through these pairings, participants generate a set of strategic directions that respond effectively to their institutional context and provide a foundation for developing SMART goals and action plans.

4. SMART Goals

Based on the TOWS framework, participants define focused objectives using the SMART approach, ensuring each goal is **Specific**, **Measurable**, **Achievable, Relevant**, and **Time-bound**. While the TOWS Matrix defines what needs to be done at a strategic level, the SMART framework and Action Plan specify how and when it will be achieved.

5. Analytic Hierarchy Process

The Analytic Hierarchy Process (AHP) was used as the primary quantitative decision-support methodology for prioritising institutional action plans. The AHP methodology enabled respondents to perform

pairwise comparisons among strategic criteria and proposed institutional actions. Consistency Ratio analysis was used to evaluate the reliability and coherence of the judgments provided by respondents during the AHP evaluation process.

The AHP process includes the following steps:

Step 1: Construction of pairwise comparison matrices for criteria and alternatives

The pairwise comparison judgements from each respondent are transformed into pairwise comparison matrices. A pairwise comparison matrix of order *n*, $A = [a_{ij}]$ is a square matrix with entries $a_{ij} > 0$ and reciprocity $a_{ij} = \frac{1}{a_{ji}}$ for all *i, j* (Bozóki et al, 2013).

Step 2: Aggregation of individual judgments using the Geometric Mean Method

Since multiple respondents participated in the survey, individual judgments were aggregated into a single institutional comparison matrix using the **Geometric Mean Method** (GMM). GMM is widely used in AHP to aggregate judgments of individual members within a group.

Missing pairwise comparison values were minimal and randomly distributed across respondents. Given this low level of incompleteness, no imputation was performed. Instead, aggregation was conducted using available-case data at the pairwise level, whereby the geometric mean was computed using all available judgments for each comparison. This approach aligns with standard group AHP practice under conditions of limited and non-systematic missing data.

This treatment is further supported by Harker (1987), who extended the AHP eigenvector framework to incomplete pairwise comparison matrices. His formulation demonstrates that priority vectors can still be validly estimated when not all comparisons are observed, provided that

the comparison structure remains sufficiently connected. Accordingly, small amounts of missing judgments do not invalidate the estimation of priorities when handled within an appropriate aggregation and eigenvector framework.

For *n* positive numbers $x_1, x_2, \ldots, x_n$, the GMM is $= (x_1 \times x_2 \times \ldots \times x_n)^{\frac{1}{n}}$

GMM is an appropriate method since it preserves the reciprocal property of the judgement matrix (Forman & Peniwati, 1998). A key advantage of the geometric mean is its ability to reduce the influence of extremely high or low values, which could otherwise distort the arithmetic mean (Aull-Hyde et al., 2026).

Step 3: Normalisation of the Aggregated Comparison Matrix

The normalisation technique is used to transform the judgments into a comparable unit. The transformation process aims to obtain numerical and comparable input data by using a common scale (Nazanin, V et al., 2016). The aggregated pairwise comparison matrix was normalised by dividing each matrix element by the sum of its corresponding column (Esen H, 2023).

Step 4: Calculation of Priority Vectors

The priority vector (weight) for each criterion or alternative was obtained by averaging the normalised values across each row (Esen H, 2023). The priority vector indicates how much a criterion/alternative contributes to the overall decision.

Step 5: Calculation of Weighted Sum Vectors and Eigenvalue (λ)

To assess consistency, the weighted sum vector was calculated by multiplying the aggregated comparison matrix by the priority vector.

Then divide the weighted sum vector elements by the priority vector to obtain consistency vectors. The arithmetic mean of the consistency vectors is λ (Esen H, 2023).

Step 6: Calculation of Consistency Ratio

Calculation of Consistency Ratio (CR) aims to assess the reliability of the judgments in the pairwise comparisons and identify any inconsistencies. CR is calculated by comparing the consistency index (CI) of the matrix with the average random consistency index (RI) (Esen H, 2023). Judgements are considered consistent if CR value of the comparison matrix is below 0,1 (10%).

$CR = \frac{CI}{RI}$ with $CI = \frac{\lambda - n}{n-1}$

and RI is the average CI of randomly generated reciprocal matrices of size *n*.

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49

Step 7: Calculation of Global Priorities for All Action Plans

The global priority of each action plan was calculated by multiplying the criterion weight by the local priority of the corresponding alternative (Krejčí and Stoklasa, 2018). The resulting global priorities were used to generate the final institutional ranking of action plans.

5.2 Data Collection

The methodology combines qualitative and quantitative data collection techniques, conducted through three main activities:

1. Local Expert Workshops;
2. Institutional AHP surveys;

3. Online validation workshop.

The Expert Workshops generated qualitative data related to:

- institutional bioeconomy context and mission,
- SWOT analysis outcomes,
- TOWS strategic matrix,
- SMART goals,
- AHP criteria and alternative inputs.

The AHP survey generated quantitative pairwise comparison data used for institutional prioritisation analysis. Each HEI partner was encouraged to collect responses from institutional representatives, including researchers, academic staff, and PhD students familiar with bioeconomy-related activities. The collected survey data were aggregated at the institutional level to derive institutional priority rankings.

The online validation workshop was conducted to review and validate the draft action plans developed based on the SMART Goals and the AHP prioritisation results. The workshop aimed to engage institutional decision makers and relevant stakeholders in assessing the relevance, feasibility, and strategic alignment of the proposed actions before finalisation and implementation. The workshop generated a final institutional action plan for bioeconomy research.

6. Needs Assessment

The needs assessment phase aimed to identify institutional priorities, challenges, capacities, and strategic development needs related to bioeconomy research and innovation.

The process combined participatory stakeholder engagement with structured prioritisation methodologies to ensure that institutional action plans are grounded in both stakeholder expectations and evidence-based institutional priorities.

6.1 Expert Workshop

Nine BEAMING HEI partners organised a local Expert Workshop involving Quadruple Helix stakeholders from academia, industry, public authorities, and civil society.

The workshop aimed to define each HEI's bioeconomy research focus, identify institutional strengths and challenges, and co-develop strategic goals and actions. The workshop agenda included:

- Discussion of the institutional bioeconomy context and roles;
- SWOT analysis and TOWS strategic framework activities;
- Development of SMART goals;
- Discussion of AHP criteria and alternatives.

Table 1. Overview of Expert Workshops Organised by BEAMING HEIs

Institution	Workshop Date	Number of participants	Describe in Section
AUP	16-1-2026	34	Annex II - AUP
AUT	16-7-2026	16	Annex II - AUT
BME	19-1-2026	14	Annex II - BME
EDU	2-3-2026	12	Annex II - EDU
UKIM	6-3-2026	8	Annex II - UKIM
UNIBL	12-2-2026	16	Annex II - UNIBL
UNIOS	17-2-2026	7	Annex II - UNIOS
UNSFA	25-2-2026	12	Annex II - UNSFA
UP	29-4-2026	7	Annex II - UP

The workshops enabled institutions to collect stakeholder feedback and align institutional planning with local bioeconomy needs and expectations.

The analysis of expert workshop outputs across participating HEIs revealed several common patterns regarding stakeholder engagement, institutional roles, strategic priorities, and capacity-building needs for strengthening bioeconomy development. Despite differences in institutional profiles and national contexts, the findings demonstrate a high degree of convergence in stakeholder perceptions and strategic directions.

6.1.1 Stakeholder Mapping Trends

All institutions engaged Quadruple Helix actors, though the depth of representation varied. AUP drew the largest and most balanced workshop participation (34 participants), including strong civil society input (12 participants). Other HEIs are more skewed toward academia and research, with industry, government, and civil society underrepresented in relative terms. This pattern signals a sector-wide

challenge in achieving genuine multi-actor balance in bioeconomy co-creation processes.

Current interactions are largely concentrated within academic networks, educational activities, and research collaborations, particularly through national and international projects. In contrast, engagement with industry, government agencies, and civil society organisations remains predominantly student internship and project-based, consultative, or sporadic.

A common aspiration among institutions is to strengthen stakeholder integration through long-term strategic partnerships. Industry stakeholders are expected to play a more active role in co-developing industry-linked curricula, joint labs, pilot projects, innovation hubs, and commercialisation activities. Government actors are increasingly viewed as strategic partners in policy development, funding mechanisms, and regional bioeconomy planning. Similarly, institutions seek to establish more structured collaboration with civil society through citizen science initiatives, awareness campaigns, and participatory innovation processes.

6.1.2 HEI Role Definition Trends

Role definition exercises mapped institutional positions along six dimensions: Knowledge Hub, Innovation Catalyst, Policy Advisor, Capacity Builder, Network Connector, and Sustainability Champion. Current roles largely function as providers of education and research, with limited engagement in innovation support, technology transfer, and policy development.

Common aspirations among HEIs across the six dimensions are:

1. To become a regional centre of knowledge on bioeconomy,

2. To become a leading catalyst for bioeconomy innovation by facilitating technology transfer, commercialisation, pilot projects, and entrepreneurial activities,
3. To become a recognised advisor for regional and national bioeconomy strategy by delivering evidence-based recommendations,
4. To develop bioeconomy education through interdisciplinary curricula, industry-aligned training, lifelong learning, and professional training,
5. To serve as the central connector of the bioeconomy ecosystem by coordinating multi-actor partnerships among academia, industry, government, civil society, and international organisations.
6. To lead sustainability and bioeconomy initiatives by demonstrating good practices.

Overall, the findings suggest a strategic shift from traditional academic functions toward a broader ecosystem leadership role that integrates research excellence, innovation, policy engagement, and societal impact.

6.1.3 SWOT Analysis Trends

The SWOT analyses conducted across institutions highlighted several recurring themes.

Among the **strengths**, institutions generally possess strong scientific expertise in bioeconomy-related disciplines, including agriculture, food systems, biotechnology, forestry, bio- and environmental engineering, or sustainability studies. Most institutions benefit from established research infrastructure, experienced academic staff, participation in international research projects, and strong scientific networks.

However, several common **weaknesses** were identified. These include fragmented interdisciplinary collaboration, limited technology transfer

and commercialisation mechanisms, insufficient engagement with industry, administrative burdens, and dependence on external funding sources. Many institutions also reported challenges related to entrepreneurial culture, communication capacities, and the involvement of young researchers.

Regarding **opportunities**, participants highlighted the growing policy support for bioeconomy and circular economy development at both European and national levels. Horizon Europe and other funding instruments were viewed as important enablers for institutional growth. Additional opportunities include increasing demand for sustainable bio-based solutions, expanding public-private partnerships, growing interest in circular business models, and the integration of digital technologies and artificial intelligence into bioeconomy sectors.

Common **threats** include intense competition for research funding, policy fragmentation, regulatory complexity, limited national research investments, weak market demand for research outputs in some regions, and continuing brain drain of young researchers and skilled professionals. Several institutions also identified demographic challenges and political instability as factors that may hinder long-term bioeconomy development.

6.1.4 TOWS Matrix Trends

The strategic responses generated through the TOWS analyses demonstrated strong alignment across institutions.

Strength–Opportunity (S–O) strategies primarily focused on leveraging existing scientific expertise, infrastructure, and international networks to expand participation in bioeconomy initiatives, strengthen research excellence, and increase collaboration with industry. Many institutions emphasised the importance of utilising their established capacities to attract external funding and support innovation activities.

Weakness–Opportunity (W–O) strategies focused on addressing institutional limitations through external opportunities. Common action is using EU funding and partnership to strengthen technology transfer systems, improve science communication, develop interdisciplinary research structures, and enhance entrepreneurial competencies.

Strength–Threat (S–T) strategies aimed to utilise existing institutional strengths to mitigate external risks. A common proposed action is using multidisciplinary expertise to promote bioeconomy solutions, to support the development of bioeconomy policies, and enhance adaptability to changing regulatory and technological environments.

Weakness–Threat (W–T) strategies concentrated on improving organisational resilience. Frequently proposed actions included establishing institutional bioeconomy strategies, strengthening governance mechanisms, supporting interdisciplinary collaboration, creating mentoring systems for researchers, and increasing student involvement to counteract institutional fragmentation, brain drain and workforce shortages.

6.1.5 SMART Goals and Action Trends

Cross-institutional SMART goals revealed from the workshops can be grouped into several common goal clusters.

Establishing Institutional Coordination Structures

Across institutions, a common objective is the establishment or strengthening of formal internal coordination structures to support bioeconomy research. Universities are generally moving toward creating centralised platforms, umbrella bodies, or dedicated support units to better connect researchers, improve interdisciplinary collaboration, and coordinate project development and evaluation.

Strengthening Industry–Academia Partnerships

A shared priority across institutions is strengthening collaboration with industry through applied research and co-creation activities. Universities aim to expand partnerships with agri-food and bio-based companies, using structured mechanisms such as living labs, matchmaking events, workshops, and formal agreements.

Education and Skill Development

Common actions include updating curricula, integrating bioeconomy concepts across study programs, promoting interdisciplinary learning, expanding lifelong learning opportunities, and increasing industry involvement in educational activities.

Policy Engagement and Visibility

A common objective across institutions is to strengthen their role in informing and supporting bioeconomy policy development. Universities seek to enhance the societal impact of their research through activities such as evidence-based policy advice and participation in policy discussions.

Early-Career Researcher

Countering brain drain and building future research capacity are shared concerns. Universities aim to attract, develop, and retain research talent through initiatives that support students, doctoral candidates, and early-career researchers, including training, career development, mobility opportunities, and participation in interdisciplinary research activities.

6.1.6 AHP Input Trends

The AHP input exercises revealed a high degree of consistency regarding the criteria and actions considered most important for institutional bioeconomy development.

Across institutions, frequently selected evaluation criteria included technology transfer capacity, environmental sustainability, interdisciplinary collaboration, skills development, and economic competitiveness. These criteria demonstrate that participants view bioeconomy development as a multidimensional challenge requiring balanced consideration of scientific, economic, environmental, and societal objectives.

Similarly, the action alternatives showed considerable overlap across institutions. Frequently proposed actions included establishing bioeconomy coordination structures, creating innovation hubs and pilot facilities, strengthening industry–academia collaboration, improving technology transfer mechanisms, supporting researcher training and mentoring, enhancing international networking activities, and expanding stakeholder engagement programs.

6.2 AHP Survey

Following the Expert Workshops, an institutional AHP survey was distributed across HEI partners. The survey was designed to support systematic prioritisation of proposed institutional action plans.
The aim was to identify the most important strategic actions for strengthening the university's bioeconomy research capacity based on expert judgments collected from institutional respondents.

The AHP hierarchy consisted of three levels:

- **Goal**: Prioritisation of bioeconomy research action plans for HEI institutions
- **Criteria**: Seven strategic criteria representing major dimensions of bioeconomy research development
- **Alternatives**: Twenty-one institutional action plans grouped under the criteria

The criteria used in the analysis were:

1. Innovation and investment scale-up (C1)
2. Sustainable biomass use and circularity integration (C2)
3. Environmental and climate contribution (C3)
4. Economic impact and competitiveness (C4)
5. Interdisciplinary collaboration (C5)
6. Skills development (C6)
7. Researcher career support (C7)

The action plans were used as alternatives as follows.

Criteria	Alternatives	
C1	**A1**	Develop pilot and demonstration infrastructures
	A2	Support researchers' participation in EU platforms and networks
	A3	Launch of joint pilot projects with regional agri-food and bio-based industries
	A4	Provide bioeconomy innovation training
C2	**A5**	Develop a pilot system for nutrient recycling and residue valorisation
	A6	Partner with local industries or municipalities to co-develop circular bio-based pilot solution
	A7	Integrate circular design principles into project planning and procurement

C3	**A8**	Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance
	A9	Establish institutional monitoring of biodiversity or ecosystem services linked to research activities
	A10	Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices
C4	**A11**	Develop an internal system for technology transfer and commercialisation of innovations
	A12	Establish entrepreneurial support programs
C5	**A13**	Create a Bioeconomy Research Coordination Unit
	A14	Establish collaboration/matchmaking events between industry and academia in the field of bioeconomy
	A15	Organize interdisciplinary workshops and seminars between industry and academia
C6	**A16**	Develop interdisciplinary educational programs/ bioeconomy teaching modules
	A17	Integrate bioeconomy challenges into doctoral and MSc programmes
	A18	Launch and test pilot bioeconomy courses
C7	**A19**	Establish career development programs
	A20	Provide training for writing and implementing projects
	A21	Provide internal seed funding or mobility grants for early-career led pilot research and international networking

Respondents conducted pairwise comparisons between criteria and between action plan alternatives under each criterion using the following scale:

1 = equally important
3 = slightly more important
5 = strongly more important
7 = very strongly more important
9 = extremely more important

6.3 Survey analysis

6.3.1 Summary of Response Collection

The AHP survey was distributed to nine BEAMING partner higher education institutions (HEIs) to support the prioritisation of institutional Bioeconomy Research Action Plans. The survey targeted institutional representatives involved in bioeconomy-related research.

Overall, the response collection demonstrated active institutional participation across the consortium, although the number of responses varied between institutions due to differences in engagement capacity.

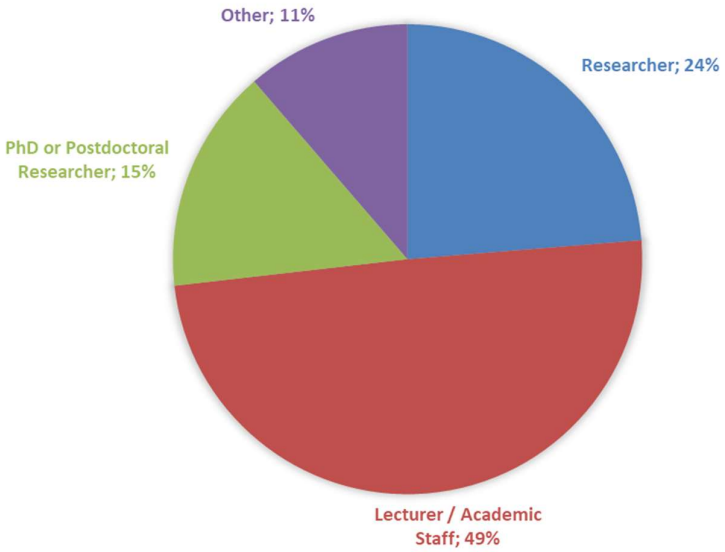
The highest number of responses was obtained from EDU (16 responses) and the UNIBL (15 responses), indicating strong institutional engagement in the prioritisation process. In contrast, AUP submitted only two responses.

Table 2. *Online AHP Survey Responses from BEAMING HEI Partners*

Institution	Number of Responses
AUP	2
AUT	10
BME	9
EDU	16
UKIM	13
UNIBL	15
UNIOS	10
UNSFA	14
UP	8

The survey respondents represented a diverse range of institutional roles and academic positions. The majority of respondents were lecturers and academic staff, followed by researchers and PhD/postdoctoral researchers.

Figure 1. Distribution of Respondent Positions



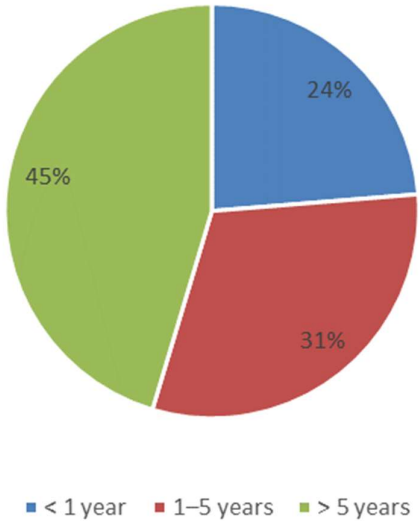
The strong representation of academic staff and researchers ensured that the prioritisation process reflected institutional expertise and practical understanding of bioeconomy-related research and innovation challenges.

The category "Other" included professors, research managers, administrative personnel, and stakeholders involved in project management and innovation support activities.

Respondents were also asked to indicate their level of experience and involvement in bioeconomy-related research and activities. The results indicate that a substantial proportion of respondents possessed significant experience in bioeconomy research, with the largest group reporting more than five years of involvement in the field. This suggests that the prioritisation results were informed by respondents with established expertise and institutional knowledge related to bioeconomy development.

At the same time, the participation of respondents with shorter experience levels contributed additional perspectives, including emerging research interests and early-career viewpoints.

Figure 2. Distribution of Respondent Experience in Bioeconomy Research



Overall, the response collection demonstrated broad participation from institutional stakeholders with varying professional roles and levels of experience. This diversity contributed to a more comprehensive and representative prioritisation process across the participating BEAMING partner institutions.

6.3.2 Institutional Prioritisation Trends

The AHP analysis revealed several common prioritisation patterns across the participating BEAMING partner institutions, while also highlighting institution-specific strategic orientations shaped by local capacities, stakeholder expectations, and institutional missions within the bioeconomy ecosystem.

Figure 3. Heatmap of Criteria Prioritisation Across HEIs

Institution	C1	C2	C3	C4	C5	C6	C7
AUP							
AUT							
BME							
EDU							
UKIM							
UNIBL							
UNIOS							
UNSFA							
UP							

Note: Dark green: Rank 1 (highest priority)
Dark red: Rank 7 (lowest priority)

Figure 3 presents a heatmap of criteria prioritisation across nine partner HEIs. Each institution ranked seven strategic criteria: C1 (Innovation and investment scale-up), C2 (Sustainable biomass use and circularity), C3 (Environmental and climate contribution), C4 (Economic competitiveness), C5 (Interdisciplinary collaboration), C6 (Skills development), and C7 (Researcher career support).

The heatmap reveals a strong institutional alignment around environmental and circularity-related priorities (C2–C3) as the highest priorities, whereas economic competitiveness (C4) and interdisciplinary collaboration (C5) were generally assigned lower rankings. Two institutions (UNIOS and UP) showed a distinct human-capital orientation, prioritising researcher support (C7).

While the heatmap illustrates the ranking patterns and divergences across institutions, aggregating these rankings reveals a clearer picture of network-wide consensus.

Figure 4. Cross-Institutional Priority Frequency (Top 3 Rankings)

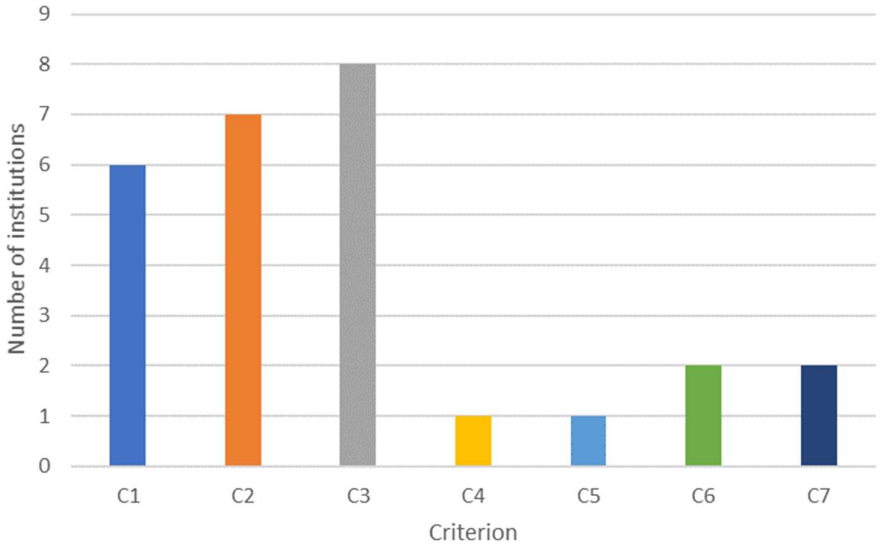
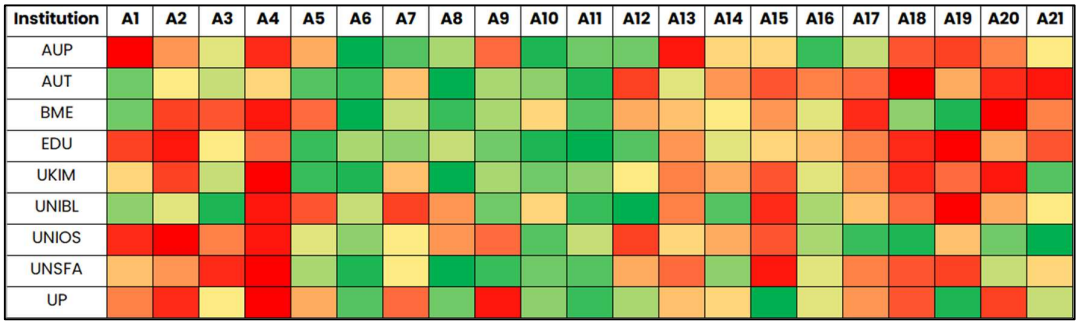


Figure 4 presents the frequency with which each criterion was selected among the top 3 priorities across the nine HEIs. As shown in Figure 4, the environmental and climate contribution (C3) was the most frequently prioritised criterion, selected by 8 of 9 institutions, followed by sustainable biomass use and circularity (C2) with 7, and innovation and investment scale-up (C1) with 6. This confirms the convergence pattern already visible in the heatmap. Sustainable biomass use and circularity (C2) and environmental and climate contribution (C3) form the network's shared strategic core. Conversely, economic competitiveness (C4) and interdisciplinary collaboration (C5) were each prioritised by only a single institution, reinforcing that these dimensions remain institution-specific concerns rather than network-wide priorities.

Figure 5. Heatmap of Action Plan Prioritisation Across HEIs



Note: Dark green: Rank 1 (highest priority)
Dark red: Rank 7 (lowest priority)

Figure 5 illustrates the final ranking of the 21 proposed actions (A1–A21) derived from the aggregated AHP results for each participating HEI. Green cells indicate actions with higher priority (rank closer to 1), whereas red cells indicate lower priority (rank closer to 21). Although each institution exhibits a distinct prioritisation pattern, several actions emerge as common priorities across multiple institutions. The analysis highlights the following recurring high-prioritised actions:

- Partner with local industries or municipalities to co-develop circular bio-based pilot solution (A6);
- Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance (A8);
- Develop an internal system for technology transfer and commercialisation of innovations (A11);
- Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (A10).

At the same time, the prioritisation outcomes also reflected institutional diversity. While some institutions prioritised sustainability-oriented and environmental actions, others placed stronger emphasis on institutional capacity building, commercialisation mechanisms, educational development, or researcher support. These differences

demonstrate that the prioritisation process successfully captured institution-specific strategic needs and development priorities rather than producing uniform outcomes across the consortium.

The variation in priorities further reflects the differing maturity levels, regional contexts, research capacities, and stakeholder ecosystems of the participating HEIs.

6.3.3 Relationship Between SMART Goals and AHP Priorities

The AHP prioritisation process was designed to complement the SMART goals and stakeholder inputs developed during the Expert Workshops. Consequently, the final institutional action planning process integrated both qualitative strategic objectives and quantitative prioritisation outcomes.

In some cases, the highest-ranked AHP action plans did not directly correspond to the SMART goals and proposed actions identified during the workshops. This outcome reflects the nature of the AHP methodology, where global priorities are influenced not only by criterion importance but also by the relative strength of alternatives within each criterion category.

For example, an action plan associated with a moderately ranked criterion could still achieve a high global priority if respondents considered that specific action highly impactful or feasible compared to other alternatives within the same criterion. Conversely, some actions linked to highly ranked criteria received lower overall rankings due to stronger competition among alternatives.

Rather than representing contradictions, these differences provide valuable strategic insight. The SMART goals primarily reflect long-term institutional ambitions and stakeholder expectations, while the AHP results provide evidence-based prioritisation regarding perceived

feasibility, institutional readiness, and expected implementation impact from the perspective of institutional respondents.

Therefore, the action planning process intentionally considered both dimensions:

- the strategic direction established through stakeholder consultation and SMART goals;
- and the operational prioritisation generated through the AHP analysis.

This combined approach supported the development of balanced institutional action plans that are both strategically ambitious and realistically implementable.

7. Action Plan development

The Institutional action plan was developed by integrating the SMART Goals and the AHP prioritisation results. This combined approach helps ensure that institutional action plans are both strategically relevant and realistically achievable within the institutional context.

While the SMART goals reflect external expectations and broader bioeconomy ecosystem priorities, the AHP results represent the internal perspectives of institutional employees regarding operational priorities, institutional readiness, and perceived urgency of implementation. HEI BEAMING partners are therefore encouraged to focus initially on three to five action plans, which are considered both impactful and realistic for short-term development.

7.1 Action Plan template

Field	Description
Priority Rank	
Action Area	
Objective	
Description of Action	
Actions	
Responsible Unit / Person	
Timeline	
Required Resources	
Expected Outputs	
Expected Outcomes	
Monitoring Indicators	
Potential Risks / Challenges	
Mitigation Measures	

7.2 Online Validation Workshop

After developing its institutional bioeconomy research action plans, each institution organised an online validation workshop to review and validate the draft of the action plans. The workshop aimed to engage institutional decision makers and relevant stakeholders in assessing the relevance, feasibility, and strategic alignment of the proposed actions before finalisation and implementation. Feedback obtained during the workshops was incorporated into the final version of each institution's action plan.

Table 3. List of BEAMING HEI Partners who organised validation workshop

Institution	Workshop organised	Describe in Section
AUP	Yes	Annex IV - AUP
AUT	Yes	Annex IV - AUT
BME	Yes	Annex IV - BME
EDU	Yes	Annex IV - EDU
UKIM	Yes	Annex IV - UKIM
UNIBL	Yes	Annex IV - UNIBL
UNIOS	Yes	Annex IV - UNIOS
UNSFA	Yes	Annex IV - UNSFA
UP	Yes	Annex IV - UP

The participating HEIs generally agreed that the proposed action plans appropriately reflected the strategic priorities identified during the expert workshops and AHP results. The proposed actions were considered relevant to institutional needs, responsive to stakeholder expectations, and supportive of broader regional and European bioeconomy objectives. Rather than introducing substantial changes to the prioritised actions, the validation workshops primarily focused on refining implementation aspects to improve the practicality and effectiveness of the plans.

Overall, the validation workshops confirmed that the action plans provide evidence-based and institutionally relevant roadmaps for

strengthening bioeconomy research capacities, with revisions primarily enhancing implementation effectiveness rather than altering the strategic priorities.

8. Institutional Action Plan

The validated Individual Bioeconomy Research Action Plans represent institution-specific implementation roadmaps developed using a common evidence-based methodology while addressing the unique strategic priorities and capacities of each participating HEI. Although the specific actions vary according to institutional context, several common strategic priorities emerged across the consortium:

One of the most frequently prioritised actions is **strengthening collaboration with industry, municipalities, and other external stakeholders** through pilot projects, applied research, and regional innovation initiatives. This reflects the shared recognition that stronger university–industry collaboration is essential for accelerating the implementation of circular bioeconomy solutions and increasing the societal impact of research.

A second common priority is the **development of institutional systems for knowledge transfer, technology transfer, innovation, and commercialisation**. Several institutions identified the need to strengthen mechanisms that facilitate the translation of research outputs into practical applications, support entrepreneurship, and enhance engagement with regional innovation ecosystems.

Environmental sustainability and circular bioeconomy principles also emerged as cross-cutting priorities. Multiple institutions prioritised actions such as implementing **Green Lab Standards**, **introducing environmental monitoring**, and **supporting circular bio-based pilot solutions**. These actions demonstrate a collective commitment to integrating sustainability considerations into research activities and institutional operations.

Another recurring priority concerns researcher capacity development and bioeconomy education. Many action plans include measures to **strengthen interdisciplinary education**, **support early-career**

researchers, **develop new educational modules**, and **integrate bioeconomy topics into undergraduate and postgraduate programmes**. These actions aim to build long-term institutional capacity by enhancing both research excellence and human capital development.

While these common priorities were observed across the consortium, each institution tailored its action plan to its own strategic objectives, existing strengths, and implementation capacities. This diversity demonstrates that the common AHP-based methodology successfully supported the development of institution-specific implementation strategies while maintaining alignment with the overarching objectives of the BEAMING project.

Consequently, the validated action plans provide practical and context-specific roadmaps that will support participating institutions in strengthening bioeconomy research, fostering knowledge valorisation, enhancing collaboration with stakeholders, and contributing to the sustainable development of regional and European bioeconomy ecosystems.

9. Conclusions

Task T6.1 successfully established a participatory and evidence-based framework for the development of institutional Bioeconomy Research Action Plans across the BEAMING HEI partners. By combining stakeholder engagement and multi-criteria decision analysis, the task enabled partner institutions to identify and prioritise actions that are aligned with both institutional needs and broader bioeconomy objectives.

The Expert Workshops provided valuable insights into institutional strengths, weaknesses, opportunities, and challenges while facilitating the formulation of SMART goals tailored to each institution's role within its local Quadruple Helix ecosystem. The subsequent AHP survey complemented these qualitative findings by introducing a systematic and transparent prioritisation process that captured the perspectives of researchers, academic staff, and institutional stakeholders.

The AHP analysis demonstrated that institutional priorities extend beyond a single strategic dimension and encompass a range of objectives related to sustainability, circularity, innovation, collaboration, skills development, and researcher support. While common trends were observed across the consortium, the prioritisation results also highlighted the diversity of institutional contexts and development pathways among the partner HEIs.

The final action plans were developed through the integration of AHP results and stakeholder feedback collected during the Expert Workshops and validated through online validation workshops. This approach ensured that institutional action plans balance strategic ambitions, stakeholder expectations, institutional feasibility, and implementation readiness.

The resulting Bioeconomy Research Action Plans provide a practical roadmap for strengthening institutional support for bioeconomy

research and innovation. Furthermore, they contribute to the broader objectives of the BEAMING project by supporting institutional transformation, fostering collaboration within local innovation ecosystems, and enhancing the societal and economic impact of bioeconomy research activities.

10. References

Aull-Hyde, R., Erdogan, S., & Duke, J. M. (2006). An experiment on the consistency of aggregated comparison matrices in AHP. European Journal of Operational Research, 171(1), 290–295. https://doi.org/10.1016/j.ejor.2004.06.037

Bozóki, S., Fülöp, J. & Poesz, A. (2015). On reducing inconsistency of pairwise comparison matrices below an acceptance threshold. Cent Eur J Oper Res 23, 849–866. https://doi.org/10.1007/s10100-014-0346-7

Carayannis, E. G., & Campbell, D. F. J. (2009). "Mode 3" and "Quadruple Helix": Toward a 21st century fractal innovation ecosystem. International Journal of Technology Management, 46(3–4), 201–234. https://doi.org/10.1504/IJTM.2009.023374

Esen, H. (2023). Analytical hierarchy process problem solution. In F. De Felice & A. Petrillo (Eds.), Analytic hierarchy process: Models, methods, concepts, and applications. IntechOpen. https://doi.org/10.5772/intechopen.1001090

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and "Mode 2" to a Triple Helix of university–industry–government relations. Research Policy, 29(2), 109–123. https://doi.org/10.1016/S0048-7333(99)00055-4

European Commission. (2025). A strategic framework for a competitive and sustainable EU bioeconomy. European Commission.

Forman, E., & Peniwati, K. (1998). Aggregating individual judgments and priorities with the Analytic Hierarchy Process. European Journal of Operational Research, 108(1), 165–169. https://doi.org/10.1016/S0377-2217(97)00244-0

Harker, P. T. (1987). Incomplete pairwise comparisons in the analytic hierarchy process. Mathematical Modelling, 9(11), 837–848. https://doi.org/10.1016/0270-0255(87)90503-3

Krejčí, J., & Stoklasa, J. (2018). Aggregation in the analytic hierarchy process: Why weighted geometric mean should be used instead of weighted arithmetic mean. Expert Systems with Applications, 114, 97–106. https://doi.org/10.1016/j.eswa.2018.06.060

Lewandowski, I. (Ed.). (2018). Bioeconomy: Shaping the transition to a sustainable, biobased economy. Springer International Publishing. https://doi.org/10.1007/978-3-319-68152-8

Annex I – AHP survey

Bioeconomy Research Action Plan – AHP Prioritisation Survey

This survey supports BEAMING HEI partners in prioritising criteria and action alternatives for bioeconomy research development using the Analytic Hierarchy Process (AHP). By comparing items in pairs, you help identify the most important institutional actions for strengthening bioeconomy capacity.

All data collected in this survey will be processed in compliance with the EU General Data Protection Regulation (GDPR). Responses are used solely for the purposes of the BEAMING project to develop individual Bioeconomy Research Action Plans for each HEI partner. No personal data will be shared with third parties. Participation is voluntary, and by submitting the survey you consent to the processing of your data for this specific purpose.

When you submit this form, it will not automatically collect your details like name and email address unless you provide it yourself.

Respondent Information

This section collects background information about the respondent, including institution, role, and experience. These details help us understand the diversity of viewpoints represented in the survey.

1. Your Institution:
    - Budapesti Muszaki Es Gazdasagtudomanyi Egyetem (BME)
    - University of Osijek, Faculty of Food Technology Osijek (UNIOS)
    - Agricultural University - Plovdiv (AUP)
    - University of Pannonia (UP)
    - University of Banja Luka (UNIBL)
    - Ss. Cyril and Methodius University in Skopje (UKIM)
    - Agricultural University of Tirana (AUT)
    - University of Novi Sad, Faculty of Agriculture (UNSFA)
    - Educons University (EDU)

2. Your Email address: (It will only be used to contact you if clarification is needed and will not be shared).
3. Your Position:
   - Researcher
   - Lecturer / Academic Staff
   - PhD or Postdoctoral
   - Other:
4. Years of experience in bioeconomy or related fields:
   - < 1 year
   - 1–5 years
   - > 5 years

Criteria Pairwise Comparison

This section asks you to compare the key criteria that guide the prioritisation of bioeconomy research action plans. You will evaluate them in pairs using the Saaty scale to indicate which criterion is more important and by how much. Below is the list of the criteria:

C1: Innovation and investment scale-up
C2: Sustainable biomass use & circularity integration
C3: Environmental & climate contribution
C4: Economic impact & competitiveness
C5: Interdisciplinary collaboration
C6: Skills development
C7: Researcher career support

You will be asked to make pairwise comparisons using the following scale:

1 = equally important
3 = slightly more important
5 = strongly more important
7 = very strongly more important
9 = extremely more important

5. C1: Innovation and investment scale-up vs C2: Sustainable biomass use & circularity integration. Which criterion is more important and by how much?
    - C1 is extremely more important than C2
    - C1 is very strongly more important than C2
    - C1 is strongly more important than C2
    - C1 is slightly more important than C2
    - C1 is equally important as C2
    - C2 is slightly more important than C1
    - C2 is strongly more important than C1
    - C2 is very strongly more important than C1
    - C2 is extremely more important than C1

6. C1: Innovation and investment scale-up vs C3: Environmental & climate contribution. Which criterion is more important and by how much?
    - C1 is extremely more important than C3
    - C1 is very strongly more important than C3
    - C1 is strongly more important than C3
    - C1 is slightly more important than C3
    - C1 is equally important as C3
    - C3 is slightly more important than C1
    - C3 is strongly more important than C1
    - C3 is very strongly more important than C1
    - C3 is extremely more important than C1

7. C1: Innovation and investment scale-up vs C4: Economic impact & competitiveness. Which criterion is more important and by how much?
    - C1 is extremely more important than C4
    - C1 is very strongly more important than C4
    - C1 is strongly more important than C4

- C1 is slightly more important than C4
- C1 is equally important as C4
- C4 is slightly more important than C1
- C4 is strongly more important than C1
- C4 is very strongly more important than C1
- C4 is extremely more important than C1

8. C1: Innovation and investment scale-up vs C5: Interdisciplinary collaboration. Which criterion is more important and by how much?
    - C1 is extremely more important than C5
    - C1 is very strongly more important than C5
    - C1 is strongly more important than C5
    - C1 is slightly more important than C5
    - C1 is equally important as C5
    - C5 is slightly more important than C1
    - C5 is strongly more important than C1
    - C5 is very strongly more important than C1
    - C5 is extremely more important than C1

9. C1: Innovation and investment scale-up vs C6: Skills development. Which criterion is more important and by how much?
    - C1 is extremely more important than C6
    - C1 is very strongly more important than C6
    - C1 is strongly more important than C6
    - C1 is slightly more important than C6
    - C1 is equally important as C6
    - C6 is slightly more important than C1
    - C6 is strongly more important than C1
    - C6 is very strongly more important than C1
    - C6 is extremely more important than C1

10. C1: Innovation and investment scale-up vs C7: Researcher career support. Which criterion is more important and by how much?
    - C1 is extremely more important than C7
    - C1 is very strongly more important than C7
    - C1 is strongly more important than C7
    - C1 is slightly more important than C7
    - C1 is equally important as C7
    - C7 is slightly more important than C1
    - C7 is strongly more important than C1
    - C7 is very strongly more important than C1
    - C7 is extremely more important than C1

11. C2: Sustainable biomass use & circularity integration vs C3: Environmental & climate contribution. Which criterion is more important and by how much?
    - C2 is extremely more important than C3
    - C2 is very strongly more important than C3
    - C2 is strongly more important than C3
    - C2 is slightly more important than C3
    - C2 is equally important as C3
    - C3 is slightly more important than C2
    - C3 is strongly more important than C2
    - C3 is very strongly more important than C2
    - C3 is extremely more important than C2

12. C2: Sustainable biomass use & circularity integration vs C4: Economic impact & competitiveness. Which criterion is more important and by how much?
    - C2 is extremely more important than C4
    - C2 is very strongly more important than C4
    - C2 is strongly more important than C4
    - C2 is slightly more important than C4
    - C2 is equally important as C4

- C4 is slightly more important than C2
- C4 is strongly more important than C2
- C4 is very strongly more important than C2
- C4 is extremely more important than C2

13. C2: Sustainable biomass use & circularity integration vs C5: Interdisciplinary collaboration. Which criterion is more important and by how much?
    - C2 is extremely more important than C5
    - C2 is very strongly more important than C5
    - C2 is strongly more important than C5
    - C2 is slightly more important than C5
    - C2 is equally important as C5
    - C5 is slightly more important than C2
    - C5 is strongly more important than C2
    - C5 is very strongly more important than C2
    - C5 is extremely more important than C2

14. C2: Sustainable biomass use & circularity integration vs C6: Skills development. Which criterion is more important and by how much?
    - C2 is extremely more important than C6
    - C2 is very strongly more important than C6
    - C2 is strongly more important than C6
    - C2 is slightly more important than C6
    - C2 is equally important as C6
    - C6 is slightly more important than C2
    - C6 is strongly more important than C2
    - C6 is very strongly more important than C2
    - C6 is extremely more important than C2

15. C2: Sustainable biomass use & circularity integration vs C7: Researcher career support. Which criterion is more important and by how much?

- C2 is extremely more important than C7
- C2 is very strongly more important than C7
- C2 is strongly more important than C7
- C2 is slightly more important than C7
- C2 is equally important as C7
- C7 is slightly more important than C2
- C7 is strongly more important than C2
- C7 is very strongly more important than C2
- C7 is extremely more important than C2

16. C3: Environmental & climate contribution vs C4: Economic impact & competitiveness. Which criterion is more important and by how much?
    - C3 is extremely more important than C4
    - C3 is very strongly more important than C4
    - C3 is strongly more important than C4
    - C3 is slightly more important than C4
    - C3 is equally important as C4
    - C4 is slightly more important than C3
    - C4 is strongly more important than C3
    - C4 is very strongly more important than C3
    - C4 is extremely more important than C3

17. C3: Environmental & climate contribution vs C5: Interdisciplinary collaboration. Which criterion is more important and by how much?
    - C3 is extremely more important than C5
    - C3 is very strongly more important than C5
    - C3 is strongly more important than C5
    - C3 is slightly more important than C5
    - C3 is equally important as C5
    - C5 is slightly more important than C3
    - C5 is strongly more important than C3
    - C5 is very strongly more important than C3

- C5 is extremely more important than C3

18. C3: Environmental & climate contribution vs C6: Skills development. Which criterion is more important and by how much?
    - C3 is extremely more important than C6
    - C3 is very strongly more important than C6
    - C3 is strongly more important than C6
    - C3 is slightly more important than C6
    - C3 is equally important as C6
    - C6 is slightly more important than C3
    - C6 is strongly more important than C3
    - C6 is very strongly more important than C3
    - C6 is extremely more important than C3

19. C3: Environmental & climate contribution vs C7: Researcher career support. Which criterion is more important and by how much?
    - C3 is extremely more important than C7
    - C3 is very strongly more important than C7
    - C3 is strongly more important than C7
    - C3 is slightly more important than C7
    - C3 is equally important as C7
    - C7 is slightly more important than C3
    - C7 is strongly more important than C3
    - C7 is very strongly more important than C3
    - C7 is extremely more important than C3

20. C4: Economic impact & competitiveness vs C5: Interdisciplinary collaboration. Which criterion is more important and by how much?
    - C4 is extremely more important than C5
    - C4 is very strongly more important than C5
    - C4 is strongly more important than C5
    - C4 is slightly more important than C5
    - C4 is equally important as C5

- C5 is slightly more important than C4
- C5 is strongly more important than C4
- C5 is very strongly more important than C4
- C5 is extremely more important than C4

21. C4: Economic impact & competitiveness vs C6: Skills development. Which criterion is more important and by how much?
    - C4 is extremely more important than C6
    - C4 is very strongly more important than C6
    - C4 is strongly more important than C6
    - C4 is slightly more important than C6
    - C4 is equally important as C6
    - C6 is slightly more important than C4
    - C6 is strongly more important than C4
    - C6 is very strongly more important than C4
    - C6 is extremely more important than C4

22. C4: Economic impact & competitiveness vs C7: Researcher career support. Which criterion is more important and by how much?
    - C4 is extremely more important than C7
    - C4 is very strongly more important than C7
    - C4 is strongly more important than C7
    - C4 is slightly more important than C7
    - C4 is equally important as C7
    - C7 is slightly more important than C4
    - C7 is strongly more important than C4
    - C7 is very strongly more important than C4
    - C7 is extremely more important than C4

23. C5: Interdisciplinary collaboration vs C6: Skills development. Which criterion is more important and by how much?
    - C5 is extremely more important than C6
    - C5 is very strongly more important than C6

- C5 is strongly more important than C6
- C5 is slightly more important than C6
- C5 is equally important as C6
- C6 is slightly more important than C5
- C6 is strongly more important than C5
- C6 is very strongly more important than C5
- C6 is extremely more important than C5

24. C5: Interdisciplinary collaboration vs C7: Researcher career support. Which criterion is more important and by how much?
    - C5 is extremely more important than C7
    - C5 is very strongly more important than C7
    - C5 is strongly more important than C7
    - C5 is slightly more important than C7
    - C5 is equally important as C7
    - C7 is slightly more important than C5
    - C7 is strongly more important than C5
    - C7 is very strongly more important than C5
    - C7 is extremely more important than C5

25. C6: Skills development vs C7: Researcher career support. Which criterion is more important and by how much?
    - C6 is extremely more important than C7
    - C6 is very strongly more important than C7
    - C6 is strongly more important than C7
    - C6 is slightly more important than C7
    - C6 is equally important as C7
    - C7 is slightly more important than C6
    - C7 is strongly more important than C6
    - C7 is very strongly more important than C6
    - C7 is extremely more important than C6

Comparison of Action Plan Alternatives

In this section, you will evaluate specific action plan activities (alternatives) under each criterion. For each criterion, you will be asked to compare the proposed activities pairwise and indicate which activity contributes more effectively to achieving that specific criterion.

C1: Innovation and investment scale-up

Action plan activities (alternatives):

A1: Develop pilot and demonstration infrastructures

A2: Support researchers' participation in EU platforms and networks

A3: Launch of joint pilot projects with regional agri-food and bio-based industries

A4: Provide bioeconomy innovation training

C2: Sustainable biomass use & circularity integration

Action plan activities (alternatives):

A5: Develop a pilot system for nutrient recycling and residue valorisation

A6: Partner with local industries or municipalities to co-develop circular bio-based pilot solutions

A7: Integrate circular design principles into project planning and procurement.

C3: Environmental & climate contribution

Action plan activities (alternatives):

A8: Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance

A9: Establish institutional monitoring of biodiversity or ecosystem services linked to research activities

A10: Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices.

C4: Economic impact & competitiveness

Action plan activities (alternatives):

A11: Develop an internal system for technology transfer and commercialisation of innovations

A12: Establish entrepreneurial support programs

C5: Interdisciplinary collaboration

Action plan activities (alternatives):

A13: Create a Bioeconomy Research Coordination Unit

A14: Establish collaboration/matchmaking events between industry and academia in the field of bioeconomy

A15: Organize interdisciplinary workshops and seminars between industry and academia

C6: Skills development

Action plan activities (alternatives):

A16: Develop interdisciplinary educational programs/bioeconomy teaching modules

A17: Integrate bioeconomy challenges into doctoral and MSc programmes

A18: Launch and test pilot bioeconomy courses

C7: Researcher career support

Action plan activities (alternatives):

A19: Establish career development programs

A20: Provide training for writing and implementing projects

A21: Provide internal seed funding or mobility grants for early-career led pilot research and international networking

26. Under criterion **C1: Innovation and investment scale-up**, which activity contributes more effectively to achieving the stated criterion?

A1: Develop pilot and demonstration infrastructures vs **A2**: Support researchers' participation in EU platforms and networks

- A1 is extremely more important than A2
- A1 is very strongly more important than A2
- A1 is strongly more important than A2
- A1 is slightly more important than A2
- A1 is equally important as A2
- A2 is slightly more important than A1
- A2 is strongly more important than A1
- A2 is very strongly more important than A1
- A2 is extremely more important than A1

27. Under criterion **C1: Innovation and investment scale-up**, which activity contributes more effectively to achieving the stated criterion?

A1: Develop pilot and demonstration infrastructures vs **A3**: Launch of joint pilot projects with regional agri-food and bio-based industries

- A1 is extremely more important than A3
- A1 is very strongly more important than A3
- A1 is strongly more important than A3
- A1 is slightly more important than A3
- A1 is equally important as A3
- A3 is slightly more important than A1
- A3 is strongly more important than A1
- A3 is very strongly more important than A1
- A3 is extremely more important than A1

28. Under criterion **C1: Innovation and investment scale-up**, which activity contributes more effectively to achieving the stated criterion?

A1: Develop pilot and demonstration infrastructures vs **A4**: Provide bioeconomy innovation training

- A1 is extremely more important than A4

- A1 is very strongly more important than A4
- A1 is strongly more important than A4
- A1 is slightly more important than A4
- A1 is equally important as A4
- A4 is slightly more important than A1
- A4 is strongly more important than A1
- A4 is very strongly more important than A1
- A4 is extremely more important than A1

29. Under criterion **C1: Innovation and investment scale-up**, which activity contributes more effectively to achieving the stated criterion?

    A2: Support researchers' participation in EU platforms and networks vs **A3**: Launch of joint pilot projects with regional agri-food and bio-based industries

    - A2 is extremely more important than A3
    - A2 is very strongly more important than A3
    - A2 is strongly more important than A3
    - A2 is slightly more important than A3
    - A2 is equally important as A3
    - A3 is slightly more important than A2
    - A3 is strongly more important than A2
    - A3 is very strongly more important than A2
    - A3 is extremely more important than A2

30. Under criterion **C1: Innovation and investment scale-up**, which activity contributes more effectively to achieving the stated criterion?

    A2: Support researchers' participation in EU platforms and networks vs **A4**: Provide bioeconomy innovation training

    - A2 is extremely more important than A4
    - A2 is very strongly more important than A4
    - A2 is strongly important than A4

- A2 is slightly more important than A4
- A2 is equally important as A4
- A4 is slightly more important than A2
- A4 is strongly more important than A2
- A4 is very strongly more important than A2
- A4 is extremely more important than A2

31. Under criterion **C1: Innovation and investment scale-up**, which activity contributes more effectively to achieving the stated criterion?
    A3: Launch of joint pilot projects with regional agri-food and bio-based industries vs **A4**: Provide bioeconomy innovation training
    - A3 is extremely more important than A4
    - A3 is very strongly more important than A4
    - A3 is strongly more important than A4
    - A3 is slightly more important than A4
    - A3 is equally important as A4
    - A4 is slightly more important than A3
    - A4 is strongly more important than A3
    - A4 is very strongly more important than A3
    - A4 is extremely more important than A3

32. Under criterion **C2: Sustainable biomass use & circularity integration**, which activity contributes more effectively to achieving the stated criterion?
    A5: Develop pilot system for nutrient recycling and residue valorisation vs **A6**: Partner with local industries or municipalities to co-develop circular bio-based pilot solutions
    - A5 is extremely more important than A6
    - A5 is very strongly more important than A6
    - A5 is strongly more important than A6
    - A5 is slightly more important than A6
    - A5 is equally important as A6

- A6 is slightly more important than A5
- A6 is strongly more important than A5
- A6 is very strongly more important than A5
- A6 is extremely more important than A5

33. Under criterion **C2: Sustainable biomass use & circularity integration**, which activity contributes more effectively to achieving the stated criterion?
A5: Develop pilot system for nutrient recycling and residue valorisation vs **A7**: Integrate circular design principles into project planning and procurement
    - A5 is extremely more important than A7
    - A5 is very strongly more important than A7
    - A5 is strongly more important than A7
    - A5 is slightly more important than A7
    - A5 is equally important as A7
    - A7 is slightly more important than A5
    - A7 is strongly more important than A5
    - A7 is very strongly more important than A5
    - A7 is extremely more important than A5

34. Under criterion **C2: Sustainable biomass use & circularity integration**, which activity contributes more effectively to achieving the stated criterion?
A6: Partner with local industries or municipalities to co-develop circular bio-based pilot solutions vs **A7**: Integrate circular design principles into project planning and procurement.
    - A6 is extremely more important than A7
    - A6 is very strongly more important than A7
    - A6 is strongly more important than A7
    - A6 is slightly more important than A7
    - A6 is equally important as A7
    - A7 is slightly more important than A6

- A7 is strongly more important than A6
- A7 is very strongly more important than A6
- A7 is extremely more important than A6

35. Under criterion **C3: Environmental & climate contribution**, which activity contributes more effectively to achieving the stated criterion?

A8: Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance vs **A9**: Establish institutional monitoring of biodiversity or ecosystem services linked to research activities

- A8 is extremely more important than A9
- A8 is very strongly more important than A9
- A8 is strongly more important than A9
- A8 is slightly more important than A9
- A8 is equally important as A9
- A9 is slightly more important than A8
- A9 is strongly more important than A8
- A9 is very strongly more important than A8
- A9 is extremely more important than A8

36. Under criterion **C3: Environmental & climate contribution**, which activity contributes more effectively to achieving the stated criterion?

A8: Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance vs **A10**: Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices

- A8 is extremely more important than A10
- A8 is very strongly more important than A10
- A8 is strongly more important than A10
- A8 is slightly more important than A10

- A8 is equally important as A10
- A10 is slightly more important than A8
- A10 is strongly more important than A8
- A10 is very strongly more important than A8
- A10 is extremely more important than A8

37. Under criterion **C3: Environmental & climate contribution**, which activity contributes more effectively to achieving the stated criterion?

    A9: Establish institutional monitoring of biodiversity or ecosystem services linked to research activities vs **A10**: Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices

    - A9 is extremely more important than A10
    - A9 is very strongly more important than A10
    - A9 is strongly more important than A10
    - A9 is slightly more important than A10
    - A9 is equally important as A10
    - A10 is slightly more important than A9
    - A10 is strongly more important than A9
    - A10 is very strongly more important than A9
    - A10 is extremely more important than A9

38. Under criterion **C4: Economic impact & competitiveness**, which activity contributes more effectively to achieving the stated criterion?

    A11: Develop internal system for technology transfer and commercialisation of innovations vs **A12**: Establish entrepreneurial support programs

    - A11 is extremely more important than A12
    - A11 is very strongly more important than A12
    - A11 is strongly more important than A12
    - A11 is slightly more important than A12

- A11 is equally important as A12
- A12 is slightly more important than A11
- A12 is strongly more important than A11
- A12 is very strongly more important than A11
- A12 is extremely more important than A11

39. Under criterion **C5: Interdisciplinary collaboration**, which activity contributes more effectively to achieving the stated criterion? **A13**: Create a Bioeconomy Research Coordination Unit vs **A14**: Establish collaboration/matchmaking events between industry and academia in the field of bioeconomy
    - A13 is extremely more important than A14
    - A13 is very strongly more important than A14
    - A13 is strongly more important than A14
    - A13 is slightly more important than A14
    - A13 is equally important as A14
    - A14 is slightly more important than A13
    - A14 is strongly more important than A13
    - A14 is very strongly more important than A13
    - A14 is extremely more important than A13

40. Under criterion **C5: Interdisciplinary collaboration**, which activity contributes more effectively to achieving the stated criterion? **A13**: Create a Bioeconomy Research Coordination Unit vs **A15**: Organize interdisciplinary workshops and seminars between industry and academia
    - A13 is extremely more important than A15
    - A13 is very strongly more important than A15
    - A13 is strongly more important than A15
    - A13 is slightly more important than A15
    - A13 is equally important as A15
    - A15 is slightly more important than A13
    - A15 is strongly more important than A13

- A15 is very strongly more important than A13
- A15 is extremely more important than A13

41. Under criterion **C5: Interdisciplinary collaboration**, which activity contributes more effectively to achieving the stated criterion? **A14**: Establish collaboration/matchmaking events between industry and academia in the field of bioeconomy vs **A15**: Organize interdisciplinary workshops and seminars between industry and academia
    - A14 is extremely more important than A15
    - A14 is very strongly more important than A15
    - A14 is strongly more important than A15
    - A14 is slightly more important than A15
    - A14 is equally important as A15
    - A15 is slightly more important than A14
    - A15 is strongly more important than A14
    - A15 is very strongly more important than A14
    - A15 is extremely more important than A14

42. Under criterion **C6: Skills development**, which activity contributes more effectively to achieving the stated criterion? **A16**: Develop interdisciplinary educational programs/bioeconomy teaching modules vs **A17**: Integrate bioeconomy challenges into doctoral and MSc programmes
    - A16 is extremely more important than A17
    - A16 is very strongly more important than A17
    - A16 is strongly more important than A17
    - A16 is slightly more important than A17
    - A16 is equally important as A17
    - A17 is slightly more important than A16
    - A17 is strongly more important than A16
    - A17 is very strongly more important than A16
    - A17 is extremely more important than A16

43. Under criterion **C6: Skills development**, which activity contributes more effectively to achieving the stated criterion?
A16: Develop interdisciplinary educational programs/bioeconomy teaching modules vs **A18**: Launch and test pilot bioeconomy courses
   - A16 is extremely more important than A18
   - A16 is very strongly more important than A18
   - A16 is strongly more important than A18
   - A16 is slightly more important than A18
   - A16 is equally important as A18
   - A18 is slightly more important than A16
   - A18 is strongly more important than A16
   - A18 is very strongly more important than A16
   - A18 is extremely more important than A16

44. Under criterion **C6: Skills development**, which activity contributes more effectively to achieving the stated criterion?
A17: Integration of bioeconomy challenges into doctoral and MSc programmes vs **A18**: Launch and test pilot bioeconomy courses
   - A17 is extremely more important than A18
   - A17 is very strongly more important than A18
   - A17 is strongly more important than A18
   - A17 is slightly more important than A18
   - A17 is equally important as A18
   - A18 is slightly more important than A17
   - A18 is strongly more important than A17
   - A18 is very strongly more important than A17
   - A18 is extremely more important than A17

45. Under criterion **C7: Researcher career support**, which activity contributes more effectively to achieving the stated criterion?

A19: Establish career development programs vs **A20**: Provide training for writing and implementing projects

- A19 is extremely more important than A20
- A19 is very strongly more important than A20
- A19 is strongly more important than A20
- A19 is slightly more important than A20
- A19 is equally important as A20
- A20 is slightly more important than A19
- A20 is strongly more important than A19
- A20 is very strongly more important than A19
- A20 is extremely more important than A19

46. Under criterion **C7: Researcher career support**, which activity contributes more effectively to achieving the stated criterion? **A19**: Establish career development programs vs **A21**: Provide internal seed funding or mobility grants for early-career-led pilot research and international networking
    - A19 is extremely more important than A21
    - A19 is very strongly more important than A21
    - A19 is strongly more important than A21
    - A19 is slightly more important than A21
    - A19 is equally important as A21
    - A21 is slightly more important than A19
    - A21 is strongly more important than A19
    - A21 is very strongly more important than A19
    - A21 is extremely more important than A19

47. Under criterion **C7: Researcher career support**, which activity contributes more effectively to achieving the stated criterion? **A20**: Provide training for writing and implementing projects vs **A21**: Provide internal seed funding or mobility grants for early-career-led pilot research and international networking
    - A20 is extremely more important than A21

- A20 is very strongly more important than A21
- A20 is strongly more important than A21
- A20 is slightly more important than A21
- A20 is equally important as A21
- A21 is slightly more important than A20
- A21 is strongly more important than A20
- A21 is very strongly more important than A20
- A21 is extremely more important than A20

Annex II – Expert Workshop Reports

AUP Expert Workshop Report

This report provides fully completed Expert Workshop for the Agricultural University of Plovdiv (AUP), developed under BEAMING Task 6.1. The content is aligned with the AUP Bioeconomy R&I Strategy, WP6–T6.1 methodological guidance, and EU bioeconomy and Green Deal policy frameworks.

Workshop Details:

Venue: Cluster Trakia Economic Zone in Plovdiv, Conference Hall

Date: 16 January 2026

Participant:

The AUP Workshop involved representatives (34 in total) from all four sectors of the Quadruple Helix model:

Stakeholder groups	Representative Roles	Number
Academia	Research managers, researchers, PhD candidates, students from Agricultural University of Plovdiv, University of Food Technology, Trakia University, Plovdiv State University, Research Institute of plant biology and biotechnology, etc.	9 participants
Industry	Business leaders, R&D managers, entrepreneurs from Plovdiv region	7 participants
Government	Policy makers (Ministry of Agriculture and Food), regional development agencies (environment, water, agroecology, business), Plovdiv regional municipalities (e.g. Plovdiv, Brezovo and Maritza)	6 participants
Civil Society	NGOs, citizen groups, community leaders	12 participants

Workshop Materials:

There was a PowerPoint presentation delivered by prof. Vladislav Popov and Mrs. Katya Staykova about the AUP and national bioeconomy context, business and entrepreneurs, plus slides including the templates for SWOT analysis, SMART goals definition and AHP input.

Facilitator Role:

There were two moderators – Mrs. Katia Staykova (Cluster Trakia Economic Zone), prof. Petar Borisov (Regional Bioeconomy Hub Plovdiv) and prof. Vladislav Povop (AUP) to guide inclusive, focused discussion.

Workshop Agenda:

Time	Activity
10.00 - 10.15	Welcome & Introduction by BEAMING coordinator for Bulgaria and the facilitators
10.15 - 11.15	National Bioeconomy Development Context, Role in Local Innovation Ecosystem, Challenges & Potential Actions, followed by extensive discussion on Challenges, Potential Opportunities, Required Actions
11.15 - 12.00	Work on the SWOT Analysis
12.00 - 12.30	**Break**
12.30 - 13.15	Co-developing SMART Goals and Action Proposals
13.15 - 14.00	Co-developing AHP criteria and alternatives input
14.00 - 14.15	Summary, Feedback & Next Steps

Results for the Workshop – AUP Bulgaria

a. AUP Stakeholder Mapping – Quadruple Helix

Helix Sector	Representative Profiles	Role in Bioeconomy R&I at AUP
Academia	Senior researchers, early-stage researchers, PhD candidates	Knowledge generation in sustainable biomass production, agroecology, circular economy, and digital agriculture; integration of bioeconomy into curricula and doctoral training.
Industry	Agri-food companies, bio-based SMEs, farmers' associations	Co-development of applied research, piloting innovations, valorisation of research outputs, internships and living labs.
Government	Ministries, regional authorities, CAP managing bodies	Policy alignment, regulatory support, funding instruments, integration with national bioeconomy and Smart Specialisation priorities.
Civil Society	NGOs, producer groups, rural communities	Societal validation of research, sustainability orientation, public engagement and social acceptance of bioeconomy solutions.

b. Role Definition – Current and Target Role of AUP in the Bioeconomy

Dimension	Current Role	Target Role (2030 Perspective)
Scientific Role	Strong national expertise in biomass production and agroecology	National and regional centre of excellence covering full bioeconomy value chains
Knowledge Hub	Provides applied-research reports, annual thematic seminars/conferences	Become the central source of bioeconomy knowledge and expertise for the region of Plovdiv & nationally.
Innovation Role	Limited downstream valorisation and technology transfer	Key innovation broker linking research, industry, and policy
Policy Role	Ad-hoc advisory contributions	Recognised evidence-based advisor for national bioeconomy policy
Educational Role	Bioeconomy elements integrated in selected curricula	Comprehensive bioeconomy education across BSc–PhD and LLL

c. SWOT Analysis – Bioeconomy Research and Innovation at AUP

Category	Key Points
Strengths	Strong expertise in biomass production, agroecology, plant health, and sustainable agriculture; modern experimental infrastructure; alignment with EU Green Deal priorities.
Weaknesses	Limited experience in biorefinery and downstream bio-based processing; fragmented interdisciplinary collaboration; constrained institutional support structures.
Opportunities	EU bioeconomy policy momentum, Horizon Europe funding, regional biomass availability, industry demand for sustainable agri-food solutions.
Threats	Insufficient national coordination on bioeconomy policy, competition for EU funding, brain drain, and regulatory uncertainty.

d. TOWS Strategic Matrix – AUP Bioeconomy Orientation

Strategy Type	Strategic Direction
S–O	Leverage strong biomass and agroecology expertise to lead national bioeconomy research aligned with EU missions.
W–O	Use EU partnerships and capacity-building instruments to strengthen biorefinery and valorisation competences.
S–T	Position AUP as a national knowledge hub to mitigate policy fragmentation and funding volatility.
W–T	Develop internal coordination mechanisms to reduce institutional fragmentation and enhance competitiveness.

e. AUP SMART Goals

Strategic Directions	Goal Title	Proposed Action	Expected Impact	Responsible Unit
S–O: Leverage strong biomass and agroecology expertise to lead national bioeconomy research aligned with EU missions	Interdisciplinary Bioeconomy Research Platform	Establish an internal cross-faculty bioeconomy research platform integrating agronomy, agroecology, biotechnology, and circular economy expertise by 2026.	Increased interdisciplinarity; improved quality and competitiveness of Horizon Europe and other EU project proposals; enhanced institutional visibility.	Rectorate; Research Office; Faculties
W–O: Use EU partnerships and capacity-building instruments to strengthen biorefinery and valorisation competences	Strengthening Downstream Bioeconomy Capacity	Launch at least two pilot projects focused on biorefinery, bio-based processing, or biomass valorisation in collaboration with EU partners and regional industry by 2027.	Enhanced downstream research capacity; improved technology readiness levels (TRLs); stronger academia–industry collaboration.	Faculties; Technology Transfer Office; External Partners
S–T: Position AUP as a national knowledge hub to mitigate policy fragmentation and funding volatility	Formalisation of Policy Advisory Role	Develop and deliver annual evidence-based policy briefs on bioeconomy topics to national and regional authorities starting in 2026.	Increased influence on national bioeconomy policy; stronger alignment between research and policy needs; recognition of AUP as a trusted advisor.	Rectorate; Research Office; Designated Policy Liaison Unit

W–T: Develop internal coordination mechanisms to reduce institutional fragmentation and enhance competitiveness	Bioeconomy Research Coordination Unit	Create a dedicated Bioeconomy Research Coordination Unit to support project development, partner matching, and alignment with EU and national strategies.	Improved internal coordination; higher success rates in competitive funding; reduced administrative burden for researchers.	Rectorate; Research Support Services
S–O: Expand educational role to support long-term bioeconomy transformation	Integration of Bioeconomy into Education and Training	Integrate bioeconomy challenges, case studies, and project-based learning into MSc and PhD programmes, including lifelong learning modules.	Strengthened human capital; improved interdisciplinary skills; better alignment of education with labour market and societal needs.	Faculties; Doctoral School; Continuing Education Units
W–O: Strengthen industry engagement and applied innovation pathways	Industry Co-creation in Bioeconomy	Establish at least five long-term strategic partnerships with agri-food and bio-based companies for applied research, pilot testing, and living labs.	Increased knowledge valorisation; higher societal and economic impact; improved technology transfer outcomes.	Faculties; Technology Transfer Office; Industry Liaison

SMART Goal	Specific & Measurable Indicators	Timeframe
Establish an Interdisciplinary Bioeconomy Research Platform	Platform operational; ≥3 joint project proposals submitted annually	By 2026
Strengthen Downstream Bioeconomy Capacity	At least 2 pilot biorefinery-related projects launched	By 2027
Formalise Policy Advisory Role	Annual policy briefs delivered to national authorities	By 2026

f. AHP Inputs

Code	Strategic Theme	Description
C1	Scientific Excellence	Contribution to high-quality, internationally visible bioeconomy research.
C2	Societal Impact	Alignment with sustainability, rural development, and Green Deal objectives.
C3	Feasibility	Compatibility with AUP's current resources and capacities.
C4	Collaboration Potential	Strengthening partnerships across the Quadruple Helix.
C5	Long-term Strategic Value	Contribution to AUP's long-term bioeconomy transformation.

Code	Related Criterion	Action Description
A1	C1–C5	Creation of a Bioeconomy Research Coordination Unit at AUP.
A2	C1–C4	Launch of joint pilot projects with regional agri-food and bio-based industries.
A3	C2–C5	Integration of bioeconomy challenges into doctoral and MSc programmes.

g. Summary, Feedback & Next Steps

Summary

An expert workshop was explicitly aligned with AUP's R&I strategy and EU bioeconomy/Green Deal policy frameworks. In preparatory planning (with input from the Regional Bioeconomy Hub, Cluster Trakia, academia, policy-makers, NGOs, municipalities, etc.), the workshop objectives were defined as follows: to present AUP's current bioeconomy activities and role in the innovation ecosystem, identify the university's strengths, weaknesses, opportunities and threats, co-develop SMART goals and practical actions to enhance interdisciplinary capacity and collaboration, and to generate input for an AHP (Analytical Hierarchy Process) questionnaire to prioritize those goals and actions. In execution, the half-day program brought together 34 stakeholders drawn from all four Quadruple Helix sectors i.e. academia (9 participants), industry (7), government (6) and civil society, ensuring broad representation in the discussions. Two experienced moderators (from Cluster Trakia Economic Zone and the Regional Bioeconomy Hub) facilitated a focused yet inclusive process, guided by preparatory materials (presentations and templates for SWOT, SMART, and AHP exercises).

During the workshop, participants first engaged in a SWOT analysis of AUP's bioeconomy R&I: for example, they noted strengths such as "strong expertise in biomass production, agroecology, plant health, and sustainable agriculture" and modern infrastructure, as well as alignment with EU Green Deal priorities; weaknesses included limited downstream bio-processing capacity and fragmented interdisciplinary support. These insights were then translated into strategic directions via a TOWS matrix (pairing SO, WO, ST, WT factors). Building on these directions, the group co-defined a set of focused SMART goals and actions. For instance, one goal is to "Establish an Interdisciplinary Bioeconomy Research Platform" to be operational by 2026 (with ≥3 joint project proposals per year), and another to "Strengthen Downstream Bioeconomy Capacity" by launching pilot biorefinery projects by 2027. These goals were fleshed out with specific actions, responsible units and timelines (see workshop report tables).

Finally, the SMART goals were mapped onto a draft AHP decision framework. Participants identified five strategic criteria (thematic lenses for prioritization), for example, "Scientific Excellence" (contribution to high-quality research), "Societal Impact" (alignment with Green Deal objectives), "Feasibility" (compatibility with AUP capacity), "Collaboration Potential", and "Long-term Strategic Value". They also enumerated action-based alternatives under these criteria, such as creating a Bioeconomy Research Coordination Unit, launching joint pilot projects with industry, and integrating bioeconomy challenges into MSc/PhD curricula. In addition to these technical outputs, participants produced a rich ecosystem map of the local bioeconomy innovation system (detailing actors in higher education, industry, government and civil society and their roles) and articulated AUP's current versus target roles (across dimensions like scientific expertise, innovation brokerage, policy advice, and education) in the regional and national bioeconomy. These outputs (ecosystem mapping, role definition, SMART goals, AHP criteria/alternatives) provide

a comprehensive foundation for the university's bioeconomy action planning.

Feedback

The workshop format was well-structured and broadly effective. Thorough preparation (including contextual presentations and pre-designed worksheets) ensured a common baseline for discussion. The facilitators maintained focus and inclusivity, and the balanced Quadruple Helix attendance was a clear strength: having academia, industry, government and civil society voices at the table helped ground discussions in real-world needs and opportunities. The stepped methodology (SWOT → TOWS → SMART → AHP) is academically rigorous and conducive to strategic planning; it successfully guided participants from high-level analysis to concrete plans. For example, the completed SWOT table and TOWS matrix yielded actionable strategic directions, and the SMART goals produced are specific and measurable (as shown by the clearly specified indicators and deadlines in the report). The AHP session gave participants a structured way to capture their judgments for later prioritization, and the identified criteria (e.g. incorporating Green Deal alignment in "Societal Impact") underline the policy relevance of the process.

Participant engagement appeared strong: discussions were reported as extensive, and the final report tables suggest that group inputs were captured systematically. The outputs themselves are clearly documented, reflecting that the facilitators translated discussion into concise goals and options. In particular, the ecosystem mapping and stakeholder-role profiling are valuable clarity-building tools. The direct linkage of outputs to higher-level policy (through AHP criteria and alignment themes) enhances their relevance to AUP's strategy development.

At the same time, several areas could be improved in future sessions. Time constraints were tight: only 45–60 minutes was allocated per

major task (SWOT, SMART, AHP), so some discussions might have been rushed. For instance, the pairwise AHP comparisons were started in the workshop but will need to continue beyond it, suggesting limited time to dive deeply into the weighting exercise. Relatedly, the AHP methodology is quite technical; some participants (especially from non-academic sectors) may have found it challenging without more orientation. Ensuring that all stakeholders fully understand the process and have equal voice may require additional explanation or simpler preparatory materials. Finally, while participant diversity was generally good, civil society was less numerous than academia and industry, indicating an opportunity to strengthen that representation. Ensuring that NGO and community perspectives are as fully engaged as others would improve inclusiveness.

Overall, the workshop achieved its aims of generating structured outputs for strategy development, but follow-up work will be needed to refine and implement them. The team should note these facilitation lessons, for example, allowing more time for the AHP session or scheduling a dedicated AHP calibration meeting, when planning the next phase.

Next Steps

To capitalize on the workshop results, the first priority is to complete the AHP prioritization. The draft criteria and alternatives identified should be finalized and distributed in a questionnaire to the workshop participants (and other relevant stakeholders) for pairwise comparison scoring. These additional inputs will produce quantitative weights reflecting stakeholder preferences for each strategic theme and action alternative. The resulting priority rankings will directly inform the AUP Bioeconomy Research Action Plan, ensuring that limited resources focus on the highest-impact actions.

Concurrently, the SMART goals and proposed actions from the workshop should be validated by AUP leadership and key stakeholders. This

means reviewing each goal for feasibility and institutional buy-in, allocating responsibilities (e.g. assigning the Research Office or Technology Transfer Office as indicated in the tables), and confirming timelines and budgets. Where needed, the goals should be refined, the workshop report itself notes that participants can "validate, adjust, or refine" the AHP inputs based on AUP's context. Any modifications should be documented so that each action plan item has a clear owner, resource allocation, and metric for success. For example, the goal of establishing a bioeconomy platform by 2026 (with at least 3 joint proposals annually) should be operationalised by drafting an implementation schedule and securing support from the Rectorate and faculties. The proposed policy brief goal (annual briefs to national authorities by 2026) can form the basis of a new outreach function, as suggested in the SMART tables.

Building on the stakeholder mapping exercise, AUP should establish a formal engagement mechanism to maintain Quadruple Helix collaboration. A steering committee or working group (with members from universities, industry, government, and civil society) could be formed to oversee the implementation of the bioeconomy action plan and to ensure continuity of dialogue. This body can also champion upcoming activities (e.g. coordinating joint proposals or community outreach) and help recruit broader partners. The workshop highlighted alignment with national/EU initiatives in several places (notably through the "Societal Impact" criterion and the Green Deal emphasis[10]), so it will be important for AUP to actively link its goals to those broader frameworks. Practically, this means cross-referencing the university's action plan with documents like the EU Bioeconomy Strategy, Horizon Europe mission topics, and the Bulgarian Smart Specialisation (BIOEAST) priorities. For instance, outreach to the Ministry of Agriculture (which participated in the workshop) could seek opportunities to align research agendas with upcoming CAP or Recovery Fund calls.

Finally, AUP should formalise monitoring and communication processes. One SMART goal already envisions annual policy briefs to authorities; this could be extended into an annual progress report on the bioeconomy strategy. Sharing achievements (e.g. new partnerships or funding secured) will help maintain momentum and demonstrate impact to internal leadership and external funders. By following through with these steps, finalizing the AHP prioritisation, validating and operationalising goals, strengthening stakeholder engagement, and aligning explicitly with national/EU policies, the AUP and the BEAMING project team can ensure that the workshop's outcomes translate into a robust, evidence-based AUP Bioeconomy R&I Action Plan.

h. Photos from the Event







BME Expert Workshop Report

Workshop Details:

Date & Time : 2026. 01. 19. 10:00
Location : Teams meeting
Number of Participants : 14

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Senior researchers, postdoctoral researchers, PhD students,	11
Industry	R&D managers, innovation managers, representatives of agri-food and biotechnology companies	2
Government	Policy officer	1
Civil Society	-	0

Summary of Discussion

Workshop Objectives Achieved:

- Defined BME's role in the national and regional bioeconomy innovation ecosystem, with a strong focus on interdisciplinary education, applied research, and industry collaboration.
- Identified key institutional strengths, weaknesses, opportunities, and threats through a structured SWOT analysis supported by collective Whiteboard inputs.
- Translated SWOT findings into TOWS-based strategic directions and formulated seven SMART goals with corresponding action proposals.
- Developed preliminary AHP input by clustering SMART goals into strategic themes and identifying action-based alternatives for future prioritisation.
- Facilitated collaborative reflection and validation of institutional priorities through interactive online tools and group discussion.

Key Highlights:

- Participants reached a strong consensus on the importance of strengthening interdisciplinary cooperation across faculties and research groups.
- Industry representatives highlighted the need for clearer communication channels, improved knowledge transfer, and more structured cooperation formats.
- Academic participants emphasised the strategic role of curriculum development, practice-oriented education, and international visibility.
- Discussions underlined the need for better institutional coordination to reduce fragmentation and support long-term bioeconomy initiatives.
- The shared Whiteboard environment enabled active participation, transparent idea development, and collective refinement of strategic priorities.

a. BME Stakeholder Ecosystem Mapping

Stakeholder Group	Examples	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	- Biogas plants - Bioethanol producers - Industrial biotech companies	Application partners for R&D, internships, co-innovation	Ad-hoc collaborations, project participation	Formalised R&D programmes, joint labs, industry-linked curricula
Government & Policy	- Ministry of Agriculture - Ministry of Innovation and Technology - National Research, Development and Innovation Office	Policy alignment, funding programmes, and regulatory frameworks	Participation in consultations, funding applications	Strategic policy co-creation

Academia & Research	Universities such as MATE, Debrecen Uni, Pannon Uni, MOME, etc. HUN-REN	Knowledge creation, education, fundamental & applied research	Research projects, student exchange	Joint training hubs, cross-institution doctoral programmes
Civil Society & NGOs	farmer associations, sustainability networks	Social relevance, awareness raising	workshops, outreach activities	Structured engagement programmes, citizen science projects
Students & Workforce	Hungarian Biotechnology Student's Association (MaBE)	Talent pipeline, skills development, professional networking	Internships, student projects, participation in events	Joint training programmes, mentoring schemes, career pathways, regular joint events

b. BME Role Definition

Role Category	Current Role (What the HEI does now)	Aspirational Role (What the HEI should do in the future)
Knowledge Hub	BME provides strong interdisciplinary expertise in bio- and environmental engineering, supported by joint PhD programmes and BME–HUN-REN research groups. Research output has high international visibility, but institutional bioeconomy competences remain partly fragmented.	Strengthening internal coordination and improving science communication towards industry and society.
Innovation Catalyst	The BME supports applied research and maintains existing industry engagement formats (e.g., business breakfasts), technology transfer. Collaboration formats lack clear objectives and strategic alignment.	Develop a structured bioeconomy innovation ecosystem with clearly defined collaboration mechanisms, co-designed pilot projects, stronger industry-driven research, and a reinforced technology transfer coordination function.

Policy Advisor	Academic experts contribute to sectoral and national discussions, but BME does not yet act as a coordinated institutional advisor in bioeconomy strategy development.	Become an institutional-level contributor to national and sectoral bioeconomy strategies, proactively providing evidence-based input and supporting long-term strategic policy planning.
Capacity Builder	Interdisciplinary programmes and dual education initiatives exist, but curriculum renewal and structured industry feedback are not yet fully established.	Establish a coordinated bioeconomy education framework that includes regular curriculum updates and structured industry feedback mechanisms.
Network Connector	BME actively participates in international research projects and networks and plays a coordinating role in the Hungarian BIOEAST Hub and the BIOEAST Advanced Bio-based Materials Thematic Working Group.	Expanding leadership in international bioeconomy networks to enhance institutional visibility and strategic positioning.
Sustainability Champion	Sustainability principles are present in selected research and education activities, but no fully integrated institutional bioeconomy strategy currently exists.	Develop a coherent institutional bioeconomy strategy aligned with national and EU objectives, positioning BME as a driver of sustainable and circular bioeconomy transformation in Hungary.

c. SWOT Findings

	HELPFUL	HARMFUL
INTERNAL	**STRENGTHS**	**WEAKNESSES**
	• Business breakfasts. • Interdisciplinary bio- and environmental engineering programmes delivered through cross-faculty cooperation. • BME–HUN-REN joint research groups. • Joint PhD programmes. • Strong international publication record and good international visibility. • BME Bioeconomy Working Group. • Emerging dual education programmes. • Mapped institutional competences, though expertise remains fragmented.	• Unclear objectives and insufficient communication of industry–academia engagement formats (e.g. business breakfasts). • Limited understanding of market and industry needs. • Lack of a shared language and alignment between academia and the private sector. • Absence of coherent institutional strategies. • Fragmented knowledge base and industrial partnerships across the institution.
EXTERNAL	**OPPORTUNITIES**	**THREATS**
	• Providing credible, practice-oriented success stories to strengthen company engagement. • Competence fairs and matchmaking events (BME Innolab). • Developing a coherent institutional bioeconomy strategy. • Strengthening science communication and Hungarian-language outreach publications. • BME's able to participate in Horizon Europe projects. • Launching a dedicated Master's programme in bioeconomy.	• Communication barriers between companies and academia. • Insufficient visibility of successful cooperation cases towards industry partners. • Regulatory and legal gaps in industry–academia collaboration (e.g. thesis confidentiality, limited legal support). • Conflicting interests between open academic knowledge sharing and private-sector data protection. • Rapid technological change in agriculture, requiring continuous educational changes. • National and sectoral strategies.

d. Strategic Directions (TOWS Matrix)

	STRENGTHS	WEAKNESSES
OPPORTUNITIES	**S-O Strategies**	**W-O Strategies**
	• Build interdisciplinary bioeconomy education programmes and new curricula based on strong institutional knowledge and existing research infrastructure to prepare future professionals. • Leverage existing interdisciplinary competences at universities and research institutes to actively join and lead international bioeconomy networks, platforms, and projects. • Strengthen industry–academia partnerships by capitalising on motivated industrial interest, supporting faster market and societal uptake of research results through shared language, effective communication, and aligned interests. • Develop the bioeconomy innovation ecosystem by building on existing knowledge-transfer structures (incubators, spin-offs) and strengthening entrepreneurial competences through a more coordinated and reinforced technology transfer function.	• Address weak dissemination and communication capacities through targeted knowledge-transfer and communication programmes (e.g. transversal packages via BME GTK, NGO involvement, scientific storytelling). • Strengthen international cooperation and shared knowledge bases through research group collaboration within initiatives such as BIOEAST, EELISA, and BEAMING. • Use ongoing and completed projects to support knowledge transfer, science communication, capacity building, and network development.
THREATS	**S-T Strategies**	**W-T Strategies**
	• Actively contribute academic expertise and research capacity to the development of national and sectoral strategies, mitigating strategic gaps and supporting forward-looking policy design.	• Move beyond short-term, project-based approaches by establishing a system-level, long-term research and education framework to avoid fragmented development. • Prevent competitive disadvantages caused by outdated curricula and slow methodological renewal

		through continuous curriculum development and systematic industry feedback.

e. SMART Goals and Proposed Actions

Strategic Directions	SMART Goal Title	Proposed Action	Expected Impact	Responsible Unit
Interdisciplinary, practice-oriented education programmes	Establish an institutionally recognised interdisciplinary bioeconomy education portfolio.	• Map existing bioeconomy-related and connected study programmes • Involve industry partners in curriculum development • Develop interdisciplinary teaching materials and case studies • Integrate project-based learning and industry-driven problem-solving elements • Introduce and test pilot teaching modules • Obtain institutional approval and integrate modules into curricula	Increased practical relevance of bioeconomy education, stronger interdisciplinary cooperation, improved labour market readiness of graduates, and reinforced long-term industry–university partnerships.	Relevant departments jointly
Strengthening international visibility	Leverage existing interdisciplinary competences	• Motivate researchers to join international	Enhanced international visibility and recognition of	Grant and project coordination office; relevant

	at universities and research institutes to actively join and assume leading roles in international bioeconomy networks, platforms, and projects.	platforms (institutional recognition, performance indicators) • Provide mentoring and support for platform participation and leadership roles • Strengthen university-level communication to increase visibility of researcher initiatives	the institution, leading to stronger participation in EU and other international research projects.	departments and research groups
Strengthening industry–academia cooperation and knowledge transfer	Strengthen industry–academia partnerships by capitalising on motivated industrial interest to accelerate the market and societal uptake of research results through shared language, effective communication, and aligned interests.	• Assess existing industry needs and expectations • Identify and engage relevant stakeholders • Develop a shared professional language between academia and industry • Redesign business breakfasts to better reflect private-sector needs (clear objectives, communication strategy, regular events) • Organise matchmaking events	Faster and more targeted market uptake of research results, stronger industrial engagement, and increased societal impact.	Technology Transfer Office; unit responsible for industry relations

		• Facilitate reciprocal visits between industry and the university		
Strengthening knowledge transfer	Develop the bioeconomy innovation ecosystem by building on existing knowledge-transfer structures (incubators, spin-offs) and strengthening entrepreneurial competences through a more integrated and reinforced technology transfer function.	• Establish a coordinating umbrella group • Review and redesign existing organisational structures • Allocate resources to research-support and technology-transfer units • Provide training for researchers to develop entrepreneurial and innovation competences	More effective market exploitation of research results and an increased number of spin-offs and start-ups.	Technology Transfer Office / Innovation Centre; university leadership
Clear and accessible communication	Improve weak dissemination and communication capacities through targeted knowledge-transfer and communication programmes (e.g. transversal packages via BME GTK, NGO involvement, scientific storytelling).	• Develop a dedicated communication programme • Involve BME GTK transversal training in the societal communication of research results • Create standardised communication formats (policy briefs, industry summaries, accessible research presentations)	Clearer and broader communication of research results to diverse audiences.	Communication units of the relevant departments

Coordinated projects	Establish a system-level, long-term research and education framework to replace fragmented, short-term, project-based approaches.	• Map and connect existing bioeconomy-related projects and educational initiatives • Define long-term thematic priorities • Develop an institutional coordination mechanism	A coordinated, transparent, and long-term sustainable bioeconomy research and education structure with reduced overlaps.	University and faculty leadership
Curriculum development	Prevent competitive disadvantages caused by outdated curricula and slow methodological renewal through continuous curriculum development and systematic industry feedback	• Increase motivation by formally recognising educational development activities • Separate and equally recognise teaching and research roles • Ensure access to modern digital teaching support systems • Secure dedicated resources for curriculum development • Introduce regular curriculum reviews • Support pedagogical training for academic staff	Up-to-date curricula, a more competitive workforce, and increased institutional attractiveness.	Relevant departments; university leadership

f. AHP Input

Code	Criteria	Action-based Alternative	Code	Description
C1	**Innovation and investment scale-up**	International Visibility	A1	Support researchers' participation in EU platforms and networks
C5	**Interdisciplinary collaboration**	Matchmaking events	A14	Organise regular industry–academia matchmaking events
C6	**Skills development & social engagement**	Develop interdisciplinary modules	A23	Develop and integrate interdisciplinary bioeconomy teaching modules Launch and test pilot bioeconomy courses
C7	**Knowledge Transfer & Innovation Capacity**	Researcher training	A24	Provide entrepreneurship and innovation training

g. Participant Feedback

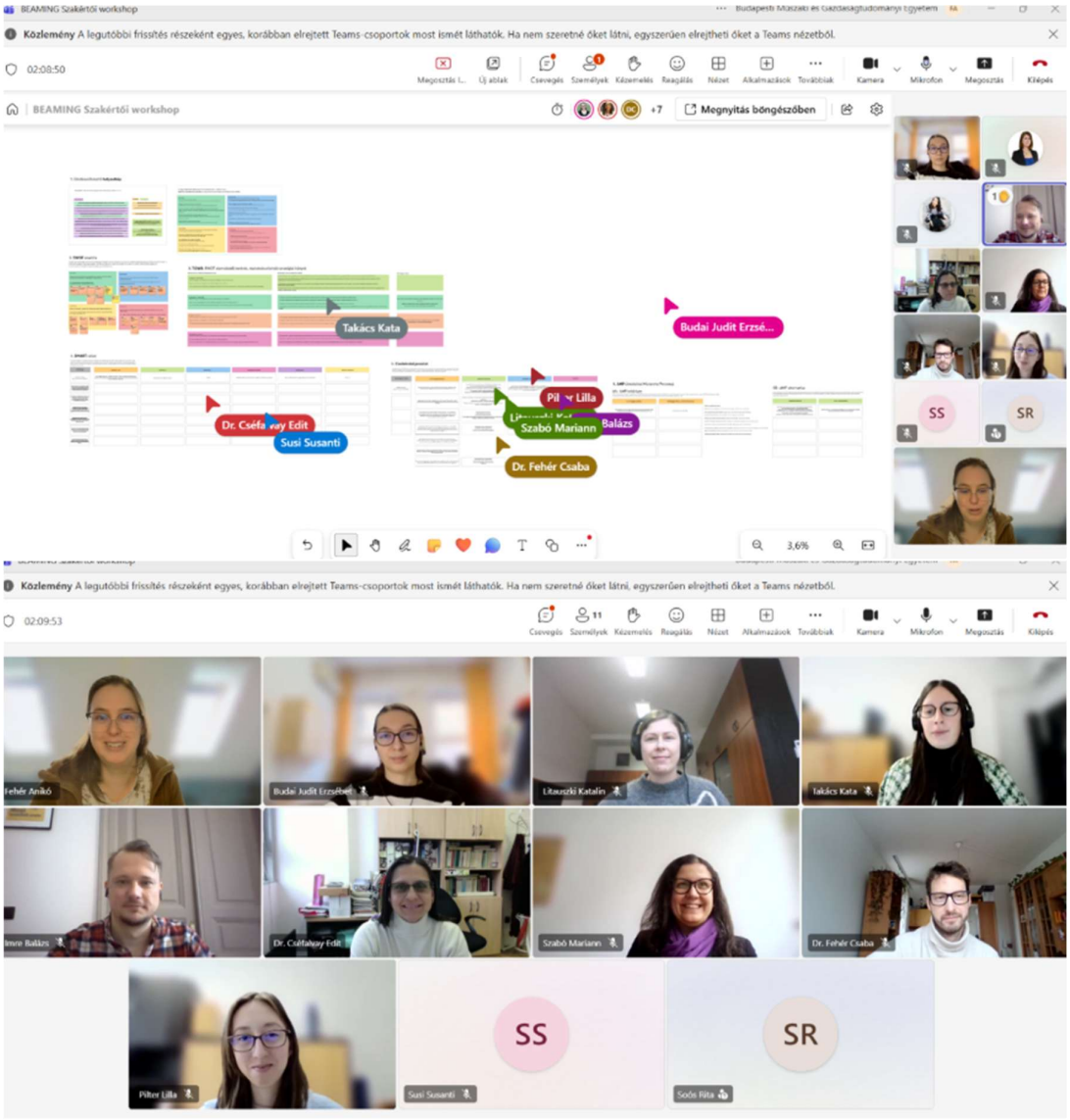
What worked well:

- The online meeting format was accessible and easy to use.
- The shared digital Whiteboard supported open, interactive collaboration and real-time idea generation.
- The structured facilitation (SWOT–TOWS–SMART sequence) helped participants gradually move from analysis to concrete, action-oriented outcomes.

Areas for improvement:

- The duration of the workshop was demanding; maintaining active engagement over a two-hour session proved challenging.
- As a result, not all planned activities could be fully completed during the session. To address this, the shared Whiteboard remained accessible after the workshop, and participants were encouraged to provide additional comments and feedback on the remaining topics.

h. Documentation



EDU Expert Workshop Report

Workshop Details:

Date & Time	: 2025. 03. 02. 10:00 – 14.15h
Location	: Teams meeting
Number of Participants	: 12

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Senior researchers, postdoctoral researchers, PhD students.	6
Industry	R&D managers, innovation managers, representatives of agri-food and biotechnology companies	2
Government	Local municipality representative	1
Civil Society	NGOs	3

Results from the Workshop:

a. EDU Bioeconomy Ecosystem Mapping

Stakeholder Group	Examples (Serbia)	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	Local agri-food SMEs, bio-based SMEs, biotech start-ups, bio-packaging companies, BIOECONOMY Cluster members, companies linked to BIO4 Campus	Innovation pilots, applied R&D, technology transfer, commercialisation, internships	Occasional collaboration through student internships, pilot projects, limited contract research	Strategic partnerships for co-innovation labs, joint patent development, shared pilot facilities, long-term SME incubation and scale-up support
Government & Policy	Ministry of Agriculture, Forestry and Water Management; Ministry of Science, Technological	Policy alignment, funding schemes, regulatory support, strategic planning	Participation in consultations and workshops, limited and	Co-authoring national and regional bioeconomy strategies, permanent

	Development and Innovation; Ministry of Environmental Protection; Regional Development Agencies; BIOEAST national contact point		project-based advisory role	advisory councils, securing long-term funding mechanisms and regulatory sandboxes
Academia & Research	University of Belgrade (Faculties of Agriculture, Forestry, Biology); Institute of Forestry; research institutes; EU and BIOEAST research networks	Joint research projects, knowledge exchange, education and training	Joint Horizon Europe proposals, informal research cooperation, fragmented infrastructure	Coordinated research clusters, shared infrastructure and data platforms, long-term consortia for bioeconomy innovation
Civil Society & NGOs	Farmer associations, environmental NGOs (e.g. WWF Adria), consumer organisations, regional civil initiatives	Social inclusion, sustainability, awareness-raising, public engagement	Occasional workshops, outreach events, limited influence on decision-making	Structured engagement programs, citizen panels, participatory research, citizen-science initiatives and monitoring roles
Students & Workforce	HEI students, vocational training centers, PhD candidates, alumni networks	Skills development, capacity building, talent pipeline	Bioeconomy-related modules in curricula, internships, isolated training initiatives	Dedicated bioeconomy study programs, innovation bootcamps, dual education models, alumni–industry mentoring schemes

b. EDU Role Definition

Role Category	Definition	Current Role (Status Quo)	Aspirational Role (Future Vision)
Knowledge Hub	The HEI acts as the primary source of scientific expertise, research data, and technical knowledge.	Provides research reports and organizes occasional academic workshops.	Becomes the central, go-to source of bioeconomy expertise for the entire region.
Innovation Catalyst	The HEI actively facilitates the transition of research into practice, supporting the commercialisation of bio-based ideas.	Supports student projects and maintains limited collaboration with local SMEs.	Leads pilot labs, bio-incubators, and provides direct support for bio-based startups.
Policy Advisor	The HEI provides evidence-based guidance to help shape regional and national bioeconomy strategies.	Contributes to policy consultations only when specifically invited by authorities.	Recognized as a formal, permanent advisor in the development of regional bioeconomy strategies.
Capacity Builder	The HEI focuses on developing the necessary skills and human capital for a sustainable bioeconomy.	Offers specific bioeconomy modules within existing university curricula.	Delivers specialized, industry-aligned training programs for the regional workforce and professionals.
Network Connector	The HEI serves as a bridge, linking academia, industry, government, and civil society to foster collaboration.	Participates in international EU consortia and hosts occasional stakeholder networking events.	Acts as the primary orchestrator and "bridge" between regional industry needs and government policy.
Sustainability Champion	The HEI leads by example in promoting circular economy principles and environmental stewardship.	Implements basic sustainability measures, such as recycling programs.	Leads large-scale regional circular bioeconomy initiatives and sets the sustainability standard.

c. SWOT Findings

HELPFUL (to achieving the goal)	HARMFUL (to achieving the goal)
STRENGTHS (Internal)	**WEAKNESSES (Internal)**
• Strong existing scientific expertise and access to bio-based innovation labs.	• Fragmented Research: Weak connections and poor understanding between researchers in different bioeconomy disciplines.
• Active participation in international networks and EU-funded projects like BEAMING.	• Entrepreneurial Gap: Lack of awareness and skills regarding entrepreneurship.
• Diverse research teams with potential for interdisciplinary work.	• Communication Barriers: Limited internal dissemination and coordination within the institution.
OPPORTUNITIES (External)	**THREATS (External)**
• Medicinal Plant Potential: High societal interest and untapped entrepreneurial opportunities.	• Resource Competition: Potential ethical and practical conflicts between bio-resource sourcing and food production.
• Quadruple Helix Synergy: Strengthening collaboration between industry, academia, government, and civil society.	• Sustainability Risks: Negative social and environmental impacts from unsustainable resource extraction.
• Strategic Funding: Availability of Horizon Europe calls and alignment with the EU Green Deal.	• External Pressure: Competition from larger, better-funded international research consortia and policy instability.

d. Strategic Directions (TOWS Matrix)

Strategic Category	Strategy Name	Actionable Description (Pairing Internal & External factors)
SO STRATEGIES *(Maxi-Maxi)*	1. Circular Agri-Waste Initiative	Use the faculty's multidisciplinary expertise (S) to lead Circular Economy projects (O) by developing protocols for agricultural waste-to-resource conversion.
Use Strengths to capitalize on Opportunities	2. Medicinal Plant Innovation Hub	Leverage ecological farming expertise (S) and BEAMING networks (S) to meet the high demand for organic medicinal plants (O).
WO STRATEGIES *(Mini-Maxi)*	3. Green Skills & Entrepreneurship	Overcome the lack of entrepreneurial skills (W) by utilizing EU Green Deal funding (O) to

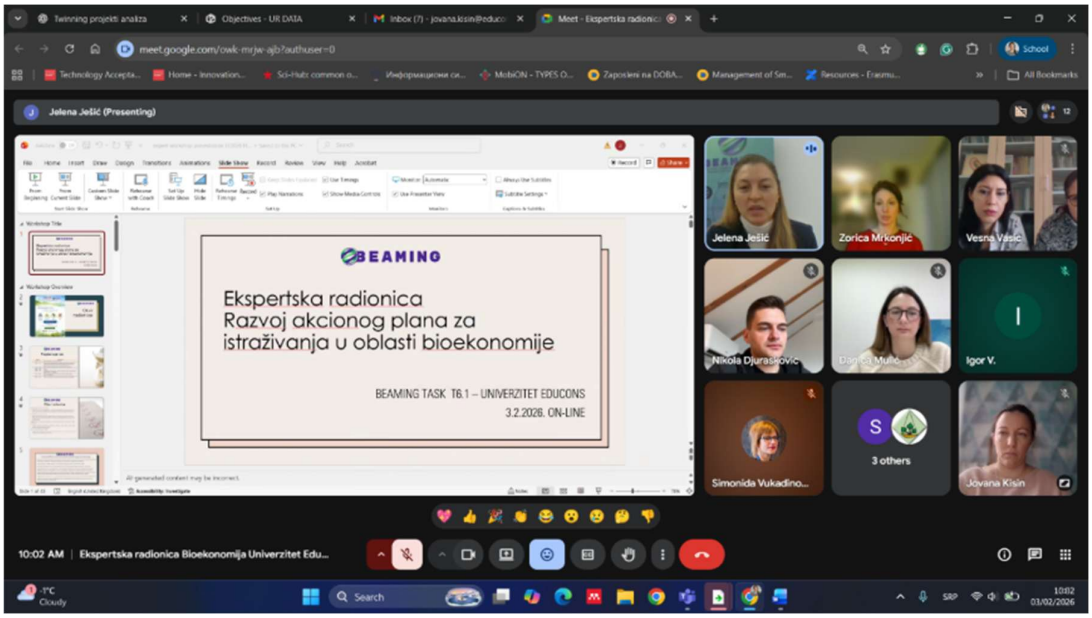
		create training modules for sustainable bio-business.
Overcome Weaknesses by using Opportunities	4. Integrated Soil Monitoring	Resolve fragmented research (W) by creating a multidisciplinary task force focused on carbon sequestration and soil health (O).
ST STRATEGIES *(Maxi-Mini)*	5. Biodiversity Shield Protocol	Use ecological agriculture standards (S) to develop a "Biodiversity Tool" that prevents the negative environmental impacts of bio-resource extraction (T).
Use Strengths to minimize Threats	6. Food-Security Certification	Leverage organic production expertise (S) to ensure that new bioeconomy projects do not compete with food production (T).
WT STRATEGIES *(Mini-Mini)*	7. Holistic Risk Management	Address internal communication gaps (W) to better respond to policy changes and climate risks (T) affecting the organic sector.
Minimize Weaknesses and avoid Threats	8. Collaborative Bio-Sourcing	Create a unified internal strategy to ensure that limited resources (W) are used efficiently, avoiding public distrust or environmental failure (T).

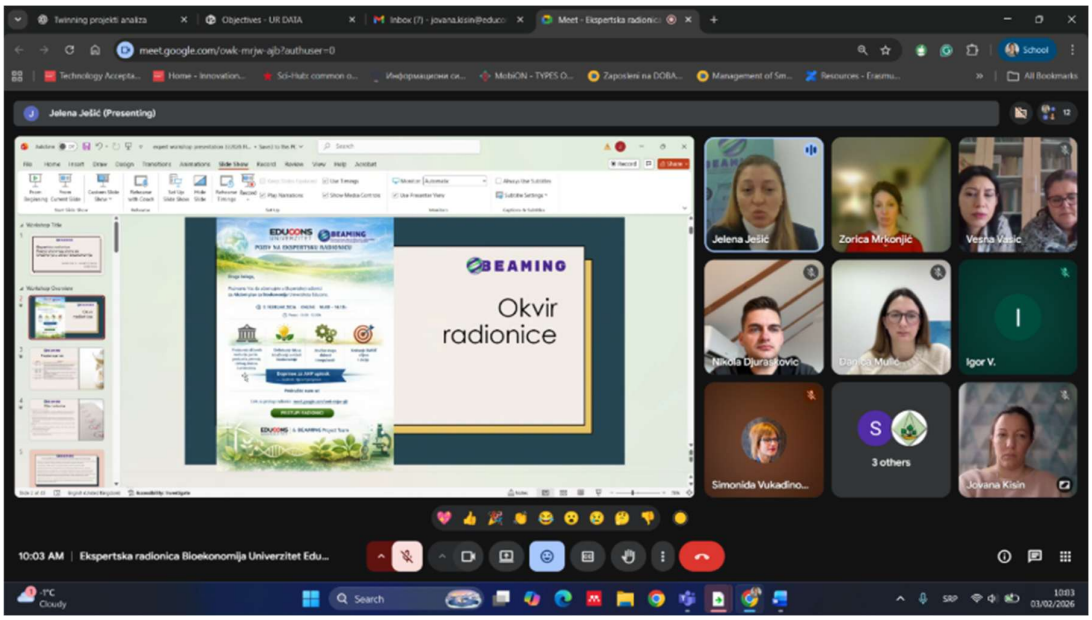
e. SMART Goals and Proposed Actions

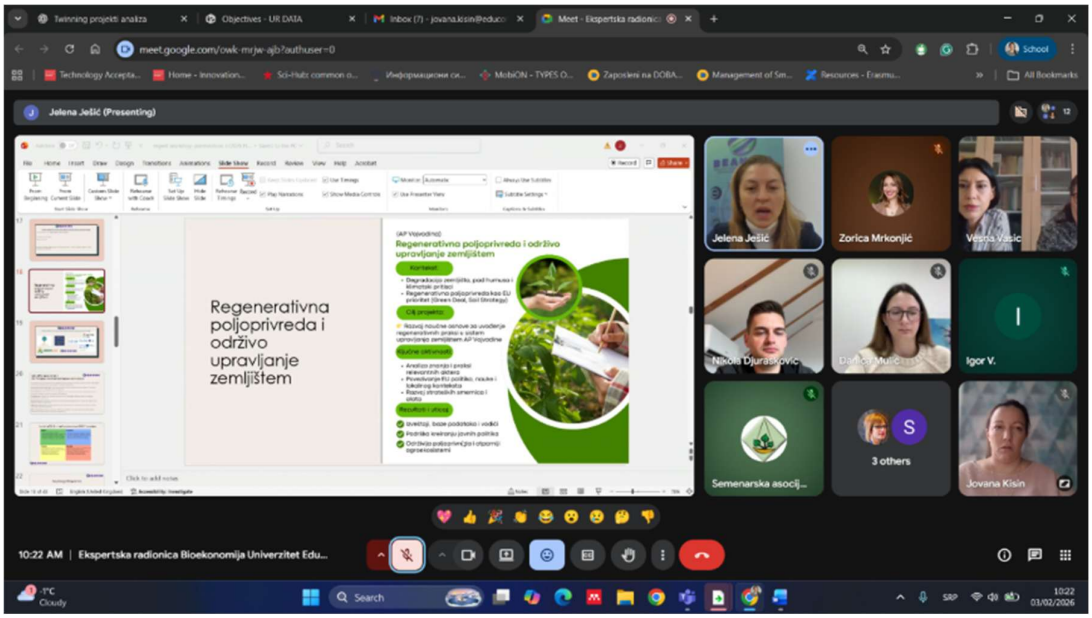
Goal ID	SMART Goal (English)	Strategic Focus & Relevance
Goal 1	Establish a "Medicinal Plant Bio-Innovation Hub" involving at least 10 multidisciplinary researchers and 5 local SMEs to co-create 2 pilot organic bio-based products.	Ecological Value: Focuses on the untapped potential of regional medicinal flora and bio-entrepreneurship.
Goal 2	Develop a "Circular Agri-Waste Protocol" for organic farms by March 2026, aimed at converting agricultural residues into bio-fertilizers, tested in 3 pilot ecological locations.	Circular Economy: Addresses waste management and sustainable sourcing within the agricultural sector.
Goal 3	Launch a "Soil Carbon & Health Monitoring Network" utilizing multidisciplinary lab expertise	Climate Action: Connects ecological agriculture with

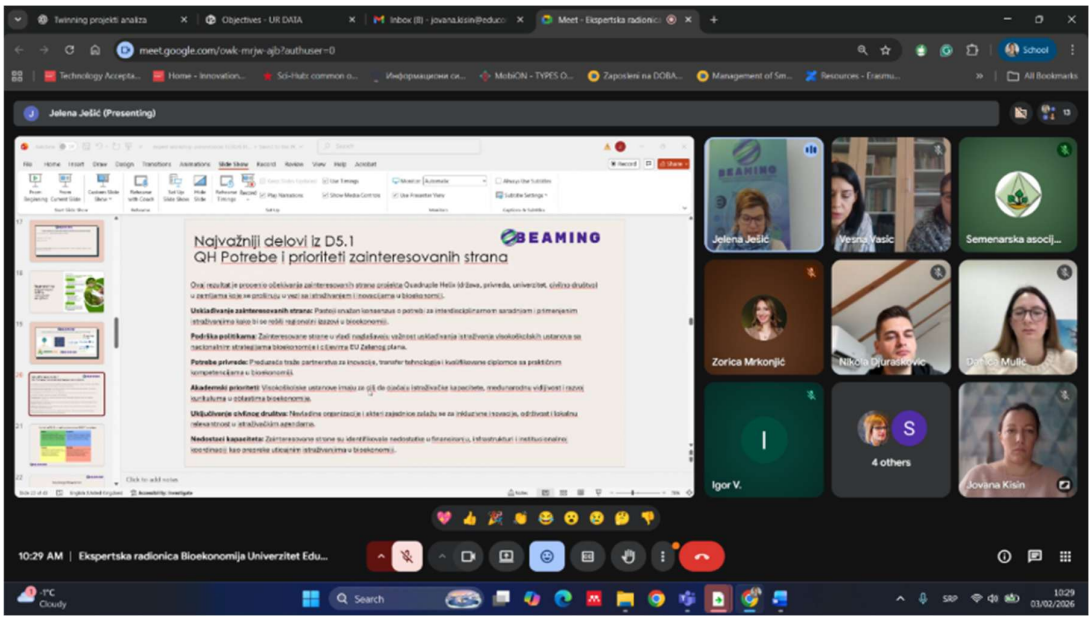
	to provide data-driven insights to organic producers.	carbon sequestration and environmental monitoring.
Goal 4	Organize 3 "Multidisciplinary Bio-Networking" workshops bringing together the departments of Agriculture, Economics, and Ecology to foster internal research collaboration.	Internal Synergy: Directly addresses the gap of fragmented connections between different research areas.
Goal 5	Formalize 2 new Quadruple Helix partnerships (Industry/Government) through signed Memorandums of Understanding (MoUs) by July 2026 to support regional bioeconomy policy development.	Policy & Impact: Ensures the faculty acts as a key "Policy Advisor" and "Network Connector" in the region.

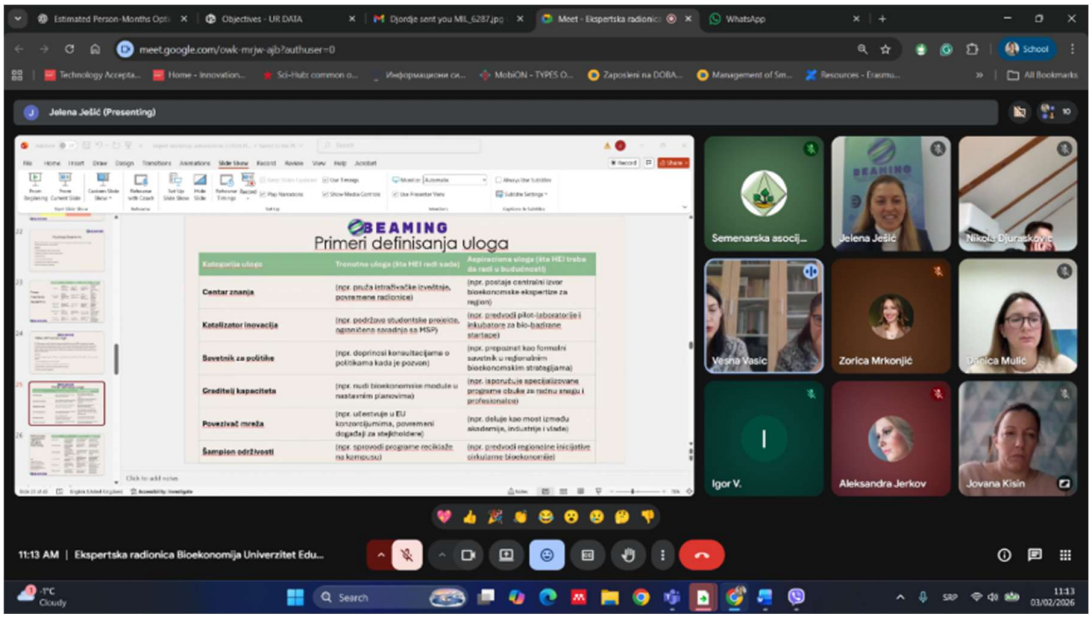
f. Documentation

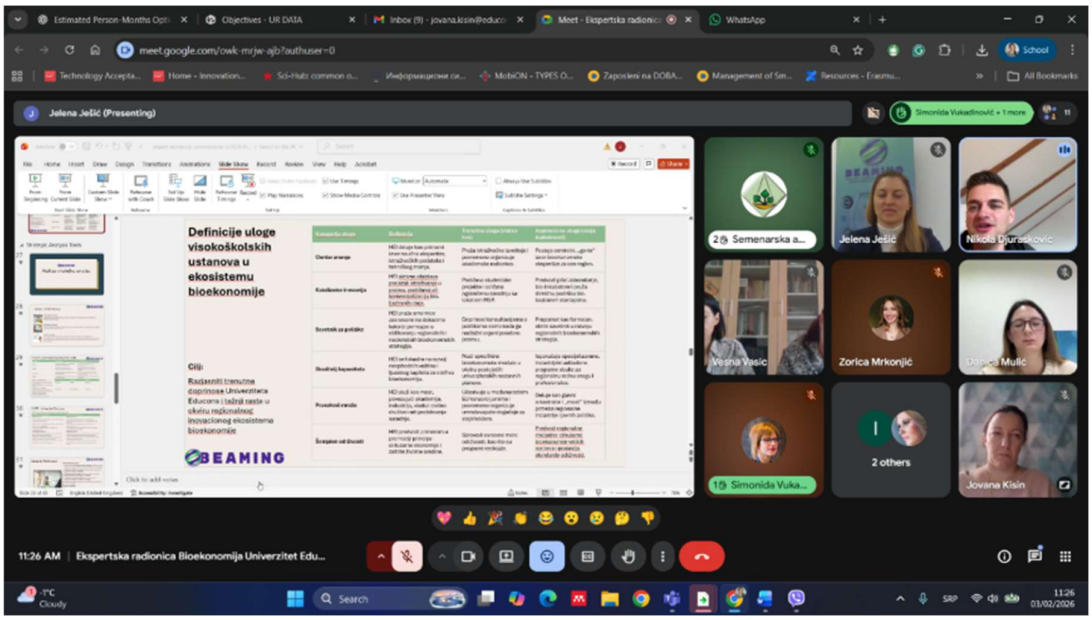


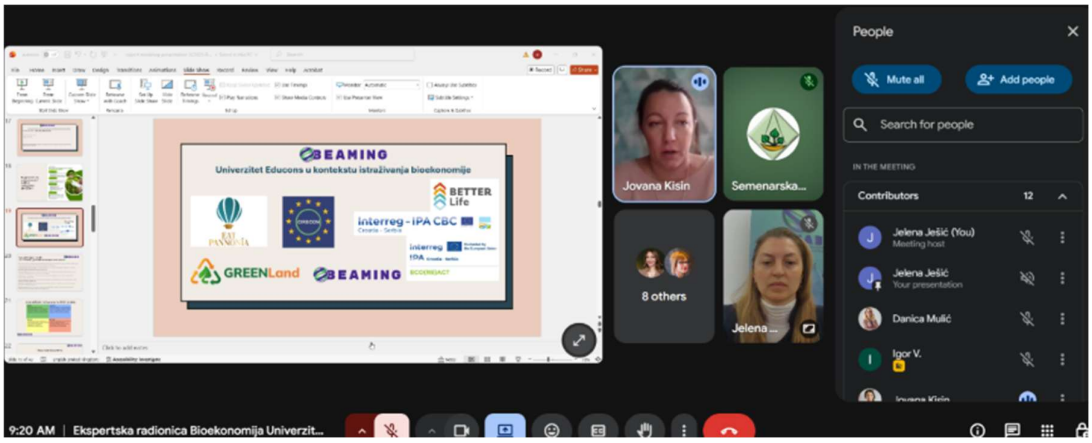

Jelena Ješić (Presenting)
Okvir radionice
Jelena Ješić
Zorica Mrkonjić
Vesna Vasic
Nikola Djurašković
Igor V.
Simonida Vukadino...
3 others
Jovana Kisin
10:03 AM | Ekspertska radionica Bioekonomija Univerzitet Edu...

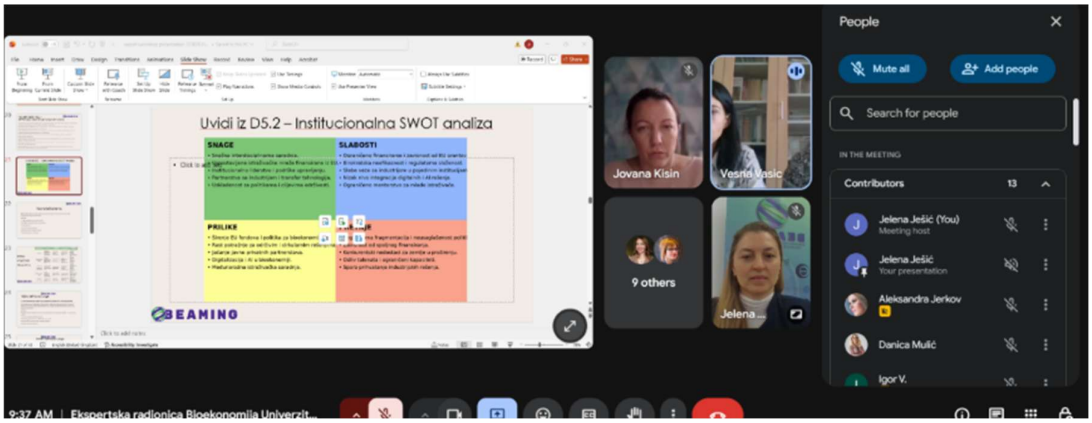

Jelena Ješić (Presenting)
Regenerativna poljoprivreda i održivo upravljanje zemljištem
Jelena Ješić
Zorica Mrkonjić
Vesna Vasic
Nikola Djurašković
Igor V.
Semenarska asocij...
3 others
Jovana Kisin
10:22 AM | Ekspertska radionica Bioekonomija Univerzitet Edu...


Jelena Ješić (Presenting)
Najvažniji delovi iz D5.1
QH Potrebe i prioriteti zainteresovanih strana
Jelena Ješić
Vesna Vasic
Semenarska asocij...
Zorica Mrkonjić
Nikola Djuraskovic
Igor V.
4 others
Jovana Kisin
10:29 AM | Ekspertska radionica Bioekonomija Univerzitet Edu...

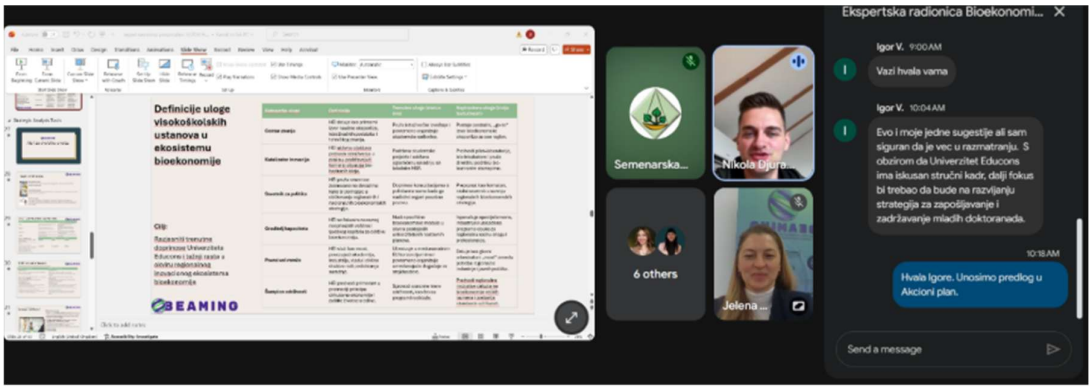

Jelena Ješić (Presenting)
Primeri definisanja uloga
Semenarska asocij...
Jelena Ješić
Vesna Vasic
Zorica Mrkonjić
Igor V.
Aleksandra Jerkov
Jovana Kisin
11:13 AM | Ekspertska radionica Bioekonomija Univerzitet Edu...

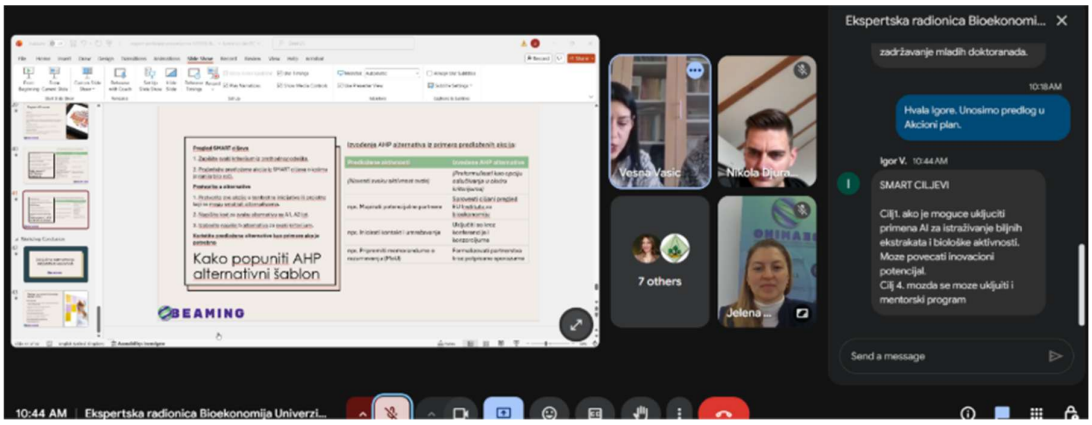

Jelena Ješić (Presenting)
Definicije uloge visokoškolskih ustanova u ekosistemu bioekonomije
Cilj:
Radionici trenutne doprinose Univerziteta Educons i razvoj rasta u okviru regionalnog inovacionog ekosistema bioekonomije
BEAMING
Jelena Ješić
Nikola Djurasković
Vesna Vasic
Zorica Mrkonjić
Dragana Mulić
2 others
Jovana Kisin
11:26 AM | Ekspertska radionica Bioekonomija Univerzitet Edu...

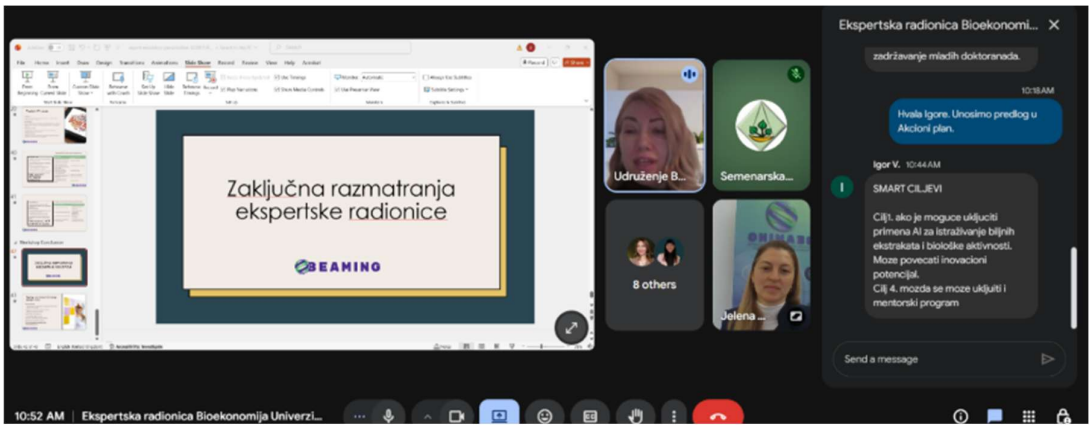

BEAMING
Univerzitet Educons u kontekstu istraživanja bioekonomije
BETTER Life
interreg - IPA CBC
GREENLand
BEAMING
People
Mute all
Add people
Search for people
IN THE MEETING
Contributors 12
Jelena Ješić (You)
Meeting host
Jelena Ješić
Your presentation
Danica Mulić
Igor V.
Jovana Kisin
Semenarska...
8 others
Jelena ...
9:20 AM | Ekspertska radionica Bioekonomija Univerzit...


Uvidi iz D5.2 – Institucionalna SWOT analiza
SNAGE
SLABOSTI
PRILIKE
BEAMING
People
Mute all
Add people
Search for people
IN THE MEETING
Contributors 13
Jelena Ješić (You)
Meeting host
Jelena Ješić
Your presentation
Aleksandra Jerkov
Danica Mulić
Igor V.
Jovana Kisin
Vesna Vasic
9 others
Jelena ...
9:37 AM | Ekspertska radionica Bioekonomija Univerzit...


Ekspertska radionica Bioekonomi...
Uvidi iz D5.2 – Institucionalna SWOT analiza
SNAGE
SLABOSTI
PRILIKE
BEAMING
Simonida added read.ai meeting notes to the meeting (recording enabled).
Read will generate a transcript of this meeting. Review our Terms of Service at https://read.ai/tos and Privacy Policy at https://read.ai/pp.
Type "read stop" to disable, or "opt out" to delete meeting data.
Open Read AI in Meet
Igor V. 9:00 AM
Vazi hvala vama
8 others
Jelena Ješić
Send a message


Definicije uloge visokoškoiskih ustanova u ekosistemu bioekonomije
BEAMING
Ekspertska radionica Bioekonomi...
Igor V. 9:00 AM
Vazi hvala vama
Igor V. 10:04 AM
Evo i moje jedne sugestije ali sam siguran da je vec u razmatranju. S obzirom da Univerzitet Educons ima iskusan stručni kadr, delji fokus bi trebao da bude na razvijanju strategija za zapošljavanje i zadržavanje mladih doktoranada.
10:18 AM
Hvala Igore. Unosimo predlog u Akcioni plan.
6 others
Send a message


Kako popuniti AHP alternativni šablon
BEAMING
Ekspertska radionica Bioekonomi...
zadržavanje mladih doktoranada.
10:18 AM
Hvala Igore. Unosimo predlog u Akcioni plan.
Igor V. 10:44 AM
SMART CILJEVI
Cilj1. ako je moguce ukljuciti primena AI za istraživanje biljnih ekstrakata i bioloških aktivnosti. Moze povecati inovacioni potencijal.
Cilj 4. mozda se moze ukljuiti i mentorski program
7 others
Send a message
10:44 AM | Ekspertska radionica Bioekonomija Univerzi...


Zaključna razmatranja ekspertske radionice
BEAMING
Udruženje B...
Semenarska...
8 others
Jelena ...
Ekspertska radionica Bioekonomi...
zadržavanje mladih doktoranada.
10:18AM
Hvala Igore. Unosimo predlog u Akcioni plan.
Igor V. 10:44 AM
SMART CIL.JEVI
Cilj1. ako je moguce ukljuciti primena AI za istrazivanje biljnih ekstrakata i biolotke aktivnosti. Moze povecati inovacioni potencijal.
Cilj 4. mozda se moze ukljuiti i mentorski program
Send a message
10:52 AM | Ekspertska radionica Bioekonomija Univerzi...

UKIM Expert Workshop Report

Introduction

This report provides the completed Expert Workshop for the Faculty of Agricultural Sciences and Food – Skopje (FASF), Ss. Cyril and Methodius University in Skopje (UKIM), developed within BEAMING Task 6.1. The workshop was organized to support the preparation of the institutional Bioeconomy Research Action Plan through participatory stakeholder engagement and strategic analysis.

The workshop gathered representatives from academia, industry, government institutions, civil society, and young researchers to discuss the current position and future role of FASF within the regional and European bioeconomy ecosystem. Through SWOT and TOWS analyses, participants identified institutional strengths, weaknesses, opportunities, and threats related to sustainable agriculture, digital transformation, circular bioeconomy, climate-smart agriculture, and knowledge valorisation.

The analytical hierarchy process enabled the transition toward defining SMART goals and strategic actions aimed at strengthening interdisciplinary research, technology transfer, digital agriculture, stakeholder engagement, and international cooperation. The workshop also generated institutional input for AHP prioritization of strategic bioeconomy actions and investments.

Workshop Details:

Date & Time	: 6 March 2026
Location	: FASF – Skopje
Number of Participants	: 8

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Professors, researchers, PhD students, project management staff	3
Industry	Representatives from agri-food companies, agricultural producers, digital agriculture companies	1
Government	Representatives from Ministry of Agriculture and related institutions	3
Civil Society	NGOs, farmer associations, rural development organisations	1

Summary of Discussions

Workshop Objectives Achieved:

• Identified the current and future role of FASF within the national and regional bioeconomy ecosystem.

• Conducted a comprehensive SWOT and TOWS analysis focused on institutional capacities, digital agriculture, sustainable agri-food systems, and stakeholder cooperation.

• Defined strategic priorities and SMART goals for strengthening research excellence, innovation capacities, technology transfer, and international cooperation.

• Identified opportunities for strengthening Quadruple Helix cooperation between academia, industry, government, and civil society.

• Generated institutional AHP input for prioritization of bioeconomy-related strategic actions.

Key Highlights:

• Participants highlighted the importance of stronger interdisciplinary collaboration between agriculture, food sciences, economics, environmental sciences, biotechnology, and digital technologies.

• Strong consensus was reached on the need to strengthen academia–industry cooperation through pilot projects, demonstration activities, living labs, and innovation platforms.

• Industry representatives emphasized the importance of practical education, innovation-oriented training, and stronger alignment between research outputs and market needs.

• Academic participants highlighted the need for stronger institutional support for Horizon Europe participation, project preparation, and international networking.

• Participants recognized the Experimental Field and laboratory infrastructure of FASF as major institutional advantages for applied research, technology validation, stakeholder training, and knowledge transfer.

• Digital agriculture, precision farming, climate-smart agriculture, and circular bioeconomy were identified as strategic thematic priorities.

a. Stakeholder Ecosystem Mapping

Stakeholder Group	Examples	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	Agri-food companies, food processors, agricultural producers, cooperatives, digital agriculture companies,	Applied research, innovation testing, technology transfer, commercialization, student internships	Project-based collaboration, consultancy, internships, participation in pilot activities	Strategic partnerships, industrial PhD collaboration, co-funded applied research and innovation platforms

	technology providers			
Government & Policy	Ministry of Agriculture Forestry and Water Economy, National Extension Agency, Paying Agency, local and regional authorities	Policy support, strategic agricultural development, evidence-based decision-making	Participation in consultations, projects, expert support	Formalized cooperation in evidence-based policy development, monitoring, and implementation of sustainable agriculture and bioeconomy strategies
Academia & Research	UKIM faculties, national institutes, international universities and networks	Joint research, interdisciplinary collaboration, mobility, education	International projects, conferences, joint publications	Interdisciplinary research projects, joint study programs, long-term bioeconomy partnerships
Civil Society & NGOs	Farmer associations, rural development NGOs, environmental organisations	Knowledge dissemination, awareness raising, participatory innovation	Workshops, training, outreach activities	Living labs/demonstration farms, co-creation activities, long-term participatory innovation models
Students & Workforce	Students, young researchers, alumni	Human capital development, innovation culture, digital and green skills	Practical training, study programs, project participation	Industry-mentored projects, entrepreneurship support, innovation bootcamps, interdisciplinary training

b. HEI Role Definition

Role Category	Current Role (What the HEI does now)	Aspirational Role (What the HEI should do in the future)
	FASF provides education and research in all agricultural and food sciences, including	Become a regional center of excellence in sustainable agriculture, digital agriculture,

Knowledge Hub	agricultural economics and bioeconomy with strong expertise in applied agricultural sciences and evidence-based policy analysis.	bioeconomy research and innovation; i.e. become national INNO-AGRI hub.
Innovation Catalyst	FASF collaborates with industry and farmers through research projects, demonstration activities, as well as providing applicative services for all quadruple helix representatives.	Develop structured innovation ecosystems, pilot projects through the INNO-AGRI hub, and stronger technology transfer mechanisms.
Policy Advisor	FASF expertise contributes to the development of agricultural and rural development policies and measures, as well as other strategic documents.	Strengthen institutional recognition as a leading advisor in sustainable agriculture, digital transformation, and bioeconomy policies.
Capacity Builder	FASF offers undergraduate, postgraduate, and doctoral education supported by practical training through the Experimental Field and its laboratories.	In the future, FASF should also develop and accreditate vocational education programs, and industry-integrated educational models.
Network Connector	Participation in Horizon Europe, Erasmus+, and other regional and international research networks. UKIM has also become member of CASEE and ICA.	Act as a strategic connector between academia, industry, government, and society in regional and European bioeconomy ecosystems.
	Sustainability, climate-smart agriculture, and circular economy concepts are integrated into research and teaching activities.	Become a regional example of sustainable resource management, digital agriculture, and circular bioeconomy implementation.

c. SWOT Findings

	HELPFUL	HARMFUL
INTERNAL	**STRENGTHS**	**WEAKNESSES**
	• Long-standing expertise in agriculture, food sciences, agricultural economics, and sustainable agriculture • Strong participation in EU-funded projects and international cooperation • Experimental Field and accredited laboratory infrastructure • Experience in applied research and stakeholder engagement • Experienced academic and research staff	• Limited technology transfer mechanisms • Administrative burden, limited research time • Need for stronger interdisciplinary integration • Limited pilot-scale infrastructure for innovation scaling • Dependence on external project funding • Limited number of young researchers
EXTERNAL	**OPPORTUNITIES**	**THREATS**
	• Increasing EU focus on bioeconomy and digitalization • Horizon Europe and international funding opportunities • Growing demand for climate-smart agriculture solution • Expansion of digital agriculture and precision farming technologies • Opportunities for stronger regional and international collaboration • Growing need for evidence-based agricultural policymaking |	• Brain drain and emigration of young researchers • Limited national research funding • Administrative and regulatory complexity • Increasing international competition for project funding • Limited private sector investment in research and innovation • Climate and market uncertainties affecting agriculture

d. Strategic Direction - TOWS MATRIX

	STRENGTHS	WEAKNESSES
OPPORTUNITIES	**S-O Strategies**	**W-O Strategies**
	Utilize existing research expertise and infrastructure to strengthen participation in Horizon Europe and bioeconomy initiatives. • Expand interdisciplinary collaboration in digital agriculture, circular bioeconomy, and climate-smart agriculture. • Strengthen demonstration and pilot activities through the Experimental Field and laboratory infrastructure. • Increase regional and international visibility through strategic partnerships and policy engagement	• Strengthen technology transfer and commercialization capacities through innovation support structures. • Use EU projects to improve pilot infrastructure and digital capacities. • Develop structured industry partnerships and industrial mentoring mechanisms. • Increase support for early-career researchers and interdisciplinary collaboration
THREATS	**S-T Strategies**	**W-T Strategies**
	• Use institutional expertise and international networks to strengthen competitiveness in research funding. • Utilize stakeholder connections to support innovation uptake and policy alignment. • Strengthen practical and innovation-oriented education to address workforce shortages and brain drain.	• Develop an institutional bioeconomy strategy with measurable indicators and strategic priorities. • Diversify funding sources and strengthen project management support. • Improve institutional governance and reduce fragmentation in research activities. • Establish long-term career development and retention mechanisms for young researchers.

e. SMART Goals and Actions

Strategic Directions	SMART Goal Title	Proposed Action	Expected Impact	Responsible Unit
Strengthening interdisciplinary research	Establish interdisciplinary research clusters in sustainable agriculture and bioeconomy	Develop thematic interdisciplinary teams integrating agriculture, food sciences, agricultural economics, environmental sciences, and digital technologies	Increased research quality and stronger project applications	Faculty Management, Institutes
Strengthening international project participation	Increase participation in Horizon Europe and international bioeconomy projects	Organize proposal development workshops and establish internal support mechanisms	Increased international cooperation and project success rate	Vice Dean for International Cooperation and Faculty's institutes
Strengthening technology transfer	Improve collaboration with industry and commercialization capacities	Develop innovation support activities, pilot projects, and demonstration platforms	Increased technology transfer and stronger industry partnerships	Faculty Management, Research Teams, Laboratory for digital agriculture, Experimental field
Development of digital agriculture capacities	Strengthen digital agriculture and precision farming activities through establishment of INNO-AGRI hub	Introduce digital agriculture training and pilot technologies	Improved innovation capacities and stronger digital transformation	Faculty management, Institutes, Experimental Field
Strengthening human capacities	Increase support for early-career researchers and PhD students	Support of mobilities, participation in international projects and	Increased participation of young researchers and stronger	Faculty Management, Institutes

		interdisciplinary doctoral collaboration	research human capacities	
Strengthening stakeholder engagement	Develop structured stakeholder collaboration platforms through the establishment of INNO-AGRI hub	Organize demo activities, stakeholder forums and co-creation activities	Improved Quadruple Helix cooperation and stakeholder engagement	Faculty Management, Project Teams
Improving research infrastructure	Expand demonstration capacities within the Experimental Field as well as research capacities within the faculty	Develop projects for upgrading laboratory and Experimental Field infrastructure	Improved applied research and innovation scaling capacities	Faculty Management, Research Teams
Enhancing policy advisory role	Strengthen institutional participation in agricultural and bioeconomy policymaking	Prepare policy briefs and evidence-based recommendations	Increased institutional influence in policy development	Faculty Management, Experts

f. AHP Input

Code	Criteria	Action-based Alternative	Code	Description
C1	Innovation and investment scale-up	Establishment of the INNO-AGRI Hub for applied bioeconomy innovation	A1	Establish the INNO-AGRI Hub as a structured institutional platform integrating pilot and demonstration activities, digital agriculture technologies, climate-smart agriculture experiments, and circular bioeconomy innovations, leveraging the FASF Experimental Field and laboratory infrastructure.

C2	Sustainable biomass use & circularity integration	Circular bioeconomy research and resource valorisation programme	A2	Develop interdisciplinary research projects targeting waste valorisation, nutrient recycling, by-product use, and circular agri-food production systems, with strong integration of agricultural economics and environmental sciences to support evidence-based circular bioeconomy policy development.
C3	Environmental & climate contribution	Integration of climate impact assessment and sustainability monitoring into FASF research	A3	Systematically integrate sustainability indicators, environmental monitoring, and climate impact assessment methodologies into FASF research activities and the Experimental Field, positioning FASF as a regional example of sustainable resource management and climate-smart agriculture implementation.
C4	Economic impact & competitiveness	Strengthening academia–industry cooperation and research commercialisation	A4	Develop structured innovation support activities, industrial PhD collaboration mechanisms, co-funded applied research platforms, and demonstration projects to accelerate commercialisation of FASF research results and align research outputs with agri-food market needs.
C5	Skills development & social engagement	Quadruple Helix stakeholder engagement and bioeconomy skills development	A5	Organise stakeholder forums, living lab activities, co-creation workshops, and demonstration events through the INNO-AGRI Hub, while developing accredited vocational and professional training programs in bioeconomy, digital agriculture, and precision

				farming targeting academia, industry, government, and civil society representatives.
C6	Early career researcher support	Early-career researcher retention and interdisciplinary doctoral development	A6	Establish long-term career development and retention mechanisms for young researchers and PhD students, including mentoring programmes, Erasmus+ and Horizon Europe mobility grants, proposal-writing support, and interdisciplinary doctoral collaboration, to address brain drain and strengthen FASF's research human capacities.

g. Participant Feedback

What worked well:

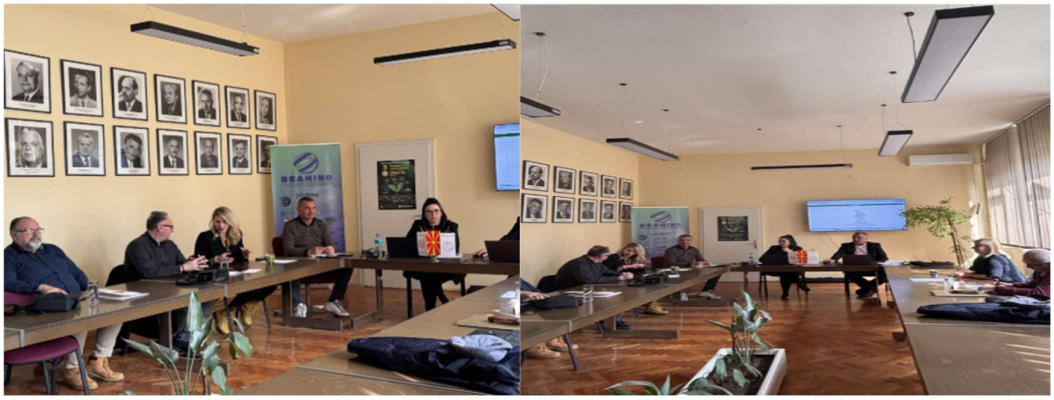
Participants highlighted the value of the participatory and interdisciplinary workshop format, which enabled active contribution from representatives of academia, industry, government, and civil society. The structured methodology based on SWOT, TOWS, SMART goals, and AHP facilitated a logical transition from institutional analysis toward defining concrete strategic actions. Stakeholders appreciated the practical orientation of discussions focused on digital agriculture, sustainability, innovation, and applied research.

Areas for improvement:

Participants noted that the integration of several analytical frameworks within a single workshop made the process intensive and time-demanding. Additional thematic workshops and follow-up meetings would support deeper operationalization of strategic priorities and

actions. Participants also suggested stronger involvement of additional industry representatives and young researchers in future activities

h. Documentation



UNIBL Expert Workshop Report

Introduction

This report provides fully completed Expert Workshop for the University of Banja Luka (UNIBL), developed under BEAMING Task 6.1. The content is aligned with the WP6–T6.1 methodological guidance.

At the beginning, Milica Maric introduced all participants with BEAMING project. Professors Zeljko Vasko and Dragan Comic guided participants through an analytical process, utilizing SWOT and TOWS matrices to identify internal strengths and external opportunities. This analytical foundation allowed the group to transition into the practical phase of defining SMART goals, resulting in a set of concrete, measurable activities designed to enhance cooperation across the "quadruple helix" of innovation. The workshop concluded with a presentation by Asst. Prof. Nemanja Jalić, PhD from the Faculty of Agriculture. Dr. Jalić introduced the criteria and alternative inputs for AHP (Analytic Hierarchy Process) analysis.

Workshop Details:

Date & Time : 12 February 2026, 11.00 AM-15.00 PM
Location : Rectorate Building of University of Banja Luka
No. of Participants : 14 (+2 Moderators)

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Full professors, Associate professors, Assistant professors, Senior research associates, RMA staff	7
Industry	Secretary of Regional Chamber of Commerce, Cooperative auditor, Senior Professional Associate	3
Government	Head of Department in Entity Ministry, project manager	2
Civil Society	Member and Head of the Youth Agropreneurship Network	2

Summary of Discussions

Workshop Objectives Achieved:

- Successfully identified current and desired future interactions across industry, government, academia, and civil society
- Conducted a comprehensive analysis of internal strengths/weaknesses and external opportunities/threats to derive actionable strategic directions
- Formulated four specific SMART goals targeting research capacity, project quality, researcher competencies, and student involvement in bioeconomy

Key Highlights:

- Participants highlighted the need to move beyond "limited student internships" and "ad hoc consulting" toward long-term strategic cooperation and university mentoring for startups
- The workshop identified critical internal risks, such as an aging researcher population, "brain drain," and low student motivation, proposing intensive involvement of Master's and PhD students in bioeconomy theses as a primary solution
- A major strategic priority is leveraging existing international cooperation (e.g., HORIZON and Interreg) to secure a place in new initiatives specifically targeting Western Balkan partners
- Proposed actions include the systematic training of researchers in project management and the creation of "open science" repositories to make research more accessible to industry stakeholders

a. Stakeholder Ecosystem Mapping

Stakeholder Group	Examples	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	Public Forestry Management Company "Forests of Republic of Srpska", Regional Chamber of Commerce, Agrucultural Cooperatives	Acts as a partner for knowledge transfer and technology application, strengthening the university's "third mission" to develop the business sector	Limited to student internships, ad hoc lifelong learning, and occasional consulting	Establishing long-term strategic cooperation, involving the business community in practical teaching, and providing university mentoring for startups
Government & Policy	Ministry of Agriculture, Forestry and Water Management of Republic of Srpska, City Development Agency	UNIBL holds a consultative role, providing evidence-based data for legislation, public policy-making, and policy evaluation	Participation in policy consultations and expert assistance in preparing strategic documents or legal regulations	Formalized, continuous partnerships with stable funding for scientific research and deeper involvement of the academic community in strategic decision-making
Academia & Research	Faculty of Agriculture, Faculty of Forestry, Faculty of Technology, Institute for Genetic Resources, Office of Vice Rector for Scientific Research and Development	Serves as a centre for the creation, dissemination, and critical examination of knowledge through joint projects and scientific networks	Focused on education, international research grants (HORIZON, Interreg), scientific conferences, and joint publications	Transitioning toward long-term cooperation, additional networking, and more joint research projects with a specific focus on bioeconomy
Civil Society & NGOs	Youth Agripreneurs Network,	Partners in strengthening organisational and professional	Occasional training, workshops, and sporadic events aimed at NGO	Intensive cooperation characterized by mutual understanding

		capacities to enhance the capacity of society through collective problem-solving	capacity development	and more joint initiatives to solve social and bioeconomic issues
Workforce	Masters and PhD students	Students represent the primary output of the university's educational mission and the future capacity for scientific research and innovation	Primarily focused on standard education, internships, and occasional involvement in research projects. There is currently noted "insufficient involvement of young researchers" and "insufficient students' motivation for research activities	Intensive involvement in interdisciplinary research teams, increased preparation of master's and PhD theses specifically related to bioeconomy

b. HEI Role Definition

Role Category	Current Role (What the HEI does now)	Aspirational Role (What the HEI should do in the future)
Knowledge Hub	Fragmented sectoral approach to bioeconomy; education of professionals and student internships; publishing joint publications and holding scientific conferences	A center for the creation, dissemination, and critical examination of knowledge; focused on interdisciplinary and multi-institutional partnerships; high-quality research aligned with open science practices
Innovation Catalyst	Ad hoc lifelong learning and occasional consulting; successful but limited cases of technology transfer; "sleeping" human resources and equipment potential	Mentoring for startups and long-term strategic cooperation with the business sector; bringing research results closer to industry and government for practical application

Policy Advisor	Ad hoc policy consultations; expert assistance in preparing strategic documents and legal regulations when requested; consultative role for the Government	Formalized and continuous partnership with the governmental sector; providing evidence for public policy-making and active participation in their monitoring and evaluation
Capacity Builder	Occasional training and workshops for the NGO sector; limited national sources of funding leading to dependence on external grants; dual role of researchers (teaching vs. research)	Systematic training for researchers on project management and financing; strengthening administrative and technical support offices; developing capacities of young researchers and students
Network Connector	Participation in HORIZON and Interreg programs; partner to public forestry management and some private agricultural holdings; partner to NGOs for organisational capacity	Leader of interdisciplinary research teams and extensive international networks; intensive cooperation and joint initiatives with civil society; stronger links between industry, academia, and government
Sustainability Champion	Existing base of researchers in agriculture and forestry; participation in sustainable bioeconomy solutions as part of EU initiatives	Active driver of sustainable and circular bioeconomy solutions; aligning research with national and international environmental and economic priorities to ensure long-term regional sustainability

c. SWOT Findings

	HELPFUL	HARMFUL
INTERNAL	**STRENGTHS**	**WEAKNESSES**
	• Existence of an established base of researchers and "sleeping" human resources potential • Availability of existing research equipment and administrative/technical support structures • Proven success in international research cooperation (EU funding) and specific cases of technology transfer and industry collaboration	• Lack of an integrated focus on bioeconomy, relying instead on a siloed sectoral approach • Limited national funding sources, high dependence on external grants, and unstable information flows • Bureaucratic inefficiency, administrative complexity, and weak interdisciplinary cooperation

EXTERNAL	• Systems for rewarding research excellence and the provision of internal co-financing funds	• Aging researcher population, brain drain (outflow of researchers), and a "comfort zone" environment with low employee flexibility. • Insufficient involvement of young researchers, low student motivation for research, and weak project management knowledge
	OPPORTUNITIES	**THREATS**
	• Expansion of EU funds and initiatives specifically targeting bioeconomy research and Western Balkan partners • Growing societal and economic need for sustainable, circular bioeconomy solutions and digital/AI integration • Increased readiness for private-public partnerships and academic-business cooperation • Opportunities for better stakeholder communication through "open days" and the adaptation of legal regulations to support scientific research	• Political instability at both national and global levels, alongside a complex state administrative structure • Fragmented legislation, policy inconsistency, and unadopted administrative procedures for EU regulations • Slow growth of R&I financial resources, high competition for project quality, and significant emigration trends • A prevailing climate of scientific apathy and the potential marginalization of the Western Balkans in European integration

d. Strategic Direction - TOWS MATRIX

	STRENGTHS	WEAKNESSES
OPPORTUNITIES	**S-O Strategies**	**W-O Strategies**
	• Utilize the existing base of researchers and physical equipment to increase the number of project applications for expanding EU bioeconomy funds • Use established international research cooperations to secure a place in new initiatives specifically targeting Western Balkan partners • Scale up successful cases of technology transfer to meet the growing demand for	• Transition from a fragmented sectoral approach to a unified bioeconomy strategy to better align with EU initiatives and circular economy demands • Overcome the weak integration of digital tools by adopting AI and digitalization solutions currently expanding within the EU bioeconomy framework • Use the university's consultative role to help adapt national legal regulations, making them more

	sustainable and circular bioeconomy solutions in the private sector • Direct existing technical and administrative support toward fostering new academic-business partnerships	conducive to scientific research and public-private partnerships • Implement open science policies and repositories to increase the visibility and accessibility of research results to industry stakeholders
THREATS	**S-T Strategies**	**W-T Strategies**
	• Organize specialized training for the existing researcher base to navigate complex administrative structures and high project competition • Use the university's technical expertise to focus research on the specific needs of the local business sector, countering the threat of low industry interest • Leverage the internal co-financing fund and research excellence rewards to reduce the risks associated with unstable national R&I funding	• Form interdisciplinary research teams to overcome fragmented research silos and increase visibility in a highly competitive global project environment • Actively involve students in research and PhD theses to counter the "brain drain" and aging researcher population while building future capacity • Formalize cooperation with the government through official agreements to bypass legislative fragmentation and unadopted procedures • Introduce structured internal mentoring and quality-assurance mechanisms for research proposals to combat scientific apathy and improve success rates despite complex state structures

e. SMART Goals and Actions

Strategic Directions	SMART Goal Title	Proposed Action	Expected Impact	Responsible Unit
S–O: Utilize the research human, physical potential and existing networks and improve the administrative and technical environment to increase the number of project applications and other forms of cooperation in the field of bioeconomy with the private sector and partners from abroad.	Strengthening research capacities together with national and international cooperation in bioeconomy	• Mapping research capacities in bioeconomy • Strengthening project support offices • Developing partnerships with international institutions and industry • Encouraging joint project applications	• Increased number of project applications • Improved international visibility • Stronger cooperation with industry and foreign partners	• University Office of Vice-Rector for Scientific Research and Development • Faculties and Institutes • Centre for Development and Research Support
W-O: Increase the quality of research projects through the involvement of competent researchers, strengthening administrative and technical support, active participation on improving policies and	Improving quality, relevance and impact of research projects in bioeconomy	• Introducing structured internal mentoring and quality-assurance mechanisms for research proposals • Strengthening administrative and technical support • Developing open science policies and repositories • Organizing	• Higher quality research outputs • Increased applicability of research results • Stronger links with industry and policy makers	• University Office of Vice-Rector for Scientific Research and Development • Faculties and Institutes • Centre for Development and Research Support

regulations, and bringing the results of scientific research closer to the industry and government.		industry–academia dialogue events		
S–T: Organize training for researchers to better understand the possibilities of financing and conducting scientific research and bring their focus closer to the interests of the economy and government.	Enhancing researcher competencies for project funding and implementation	• Training on national and international funding programs • Workshops on Project management and financial administration •Study visits to other univerisites project development offices/centers • Thematic seminars with industry and government representatives	• Increased success rate of project applications • Better alignment of research with economic and societal priorities • Reduced risk of unsuccessful proposals • Strenghtening of international cooperation	• University Office of Vice-Rector for Scientific Research and Development • Faculties and Institutes • Centre for Development and Research Support
W–T: Organize interdisciplinary teams of researchers and involve students, thus expanding the scope of the university's scientific reach and visibility.	Strengthening interdisciplinarity and student involvement in bioeconomy research	• Formation of interdisciplinary research teams • Inclusion of students through projects and preparation of master and PHD thesis • Establishing incentive and reward systems for researchers, mentors and students • Promotion of research results	• Increased scientific visibility of the university • Development capacities of young researchers • Long-term sustainability of research capacities	• Rectorate •Faculties • Student Unions

f. AHP Input

Code	Criteria	Action-based Alternative	Code	Description
C1	Innovation and investment scale-up (15.4%)	Create interdisciplinary innovation teams to accelerate translation of research outputs into pilot deployments.	A2	The influence of the alternative on the criterion to which it belongs is 36.8%. The influence of the alternative on the achievement of the overall goal is 5.7%.
		Build partnerships with national/EU R&I funding agencies to secure grants for scale-up activities.	A3	The influence of the alternative on the criterion to which it belongs is 36.7%. The influence of the alternative on the achievement of the overall goal is 5.7%.
		Establish an internal bioeconomy innovation hub or pilot lab to support prototype development and technology validation.	A1	The influence of the alternative on the criterion to which it belongs is 26.5%. The influence of the alternative on the achievement of the overall goal is (4.1%).
C7	Early career researcher support (15.4%)	Offer tailored training in grant writing, project leadership, and interdisciplinary research methods.	A21	The influence of the alternative on the criterion to which it belongs is 27.9%. The influence of the alternative on the achievement of the overall goal is (4.3%).
		Establish a structured mentorship program connecting early-career researchers with senior experts.	A19	The influence of the alternative on the criterion to which it belongs is 24.8%. The influence of the alternative on the achievement of the overall goal is (3.8%).
		Create career-development pathways that include recognition of	A20	The influence of the alternative on the

		early-career achievements and leadership roles.		criterion to which it belongs is 23.8%. The influence of the alternative on the achievement of the overall goal is (3.7%).
		Provide seed funding or mobility grants for early-career-led pilot projects or international exchanges.	A22	The influence of the alternative on the criterion to which it belongs is 23,6%. The influence of the alternative on the achievement of the overall goal is (3.6%).
C4	Economic impact & competitiveness (15.2%)	Set up an internal commercialisation pipeline (technology transfer office, patents, spin-off support).	A10	The influence of the alternative on the criterion to which it belongs is 37.9%. The influence of the alternative on the achievement of the overall goal is (5.8%).
		Launch internal entrepreneurship programs to support staff and student-led bio-based ventures.	A11	The influence of the alternative on the criterion to which it belongs is 31.8%. The influence of the alternative on the achievement of the overall goal is (4.8%).
		Conduct socio-economic impact assessments for major research outputs to guide investment decisions.	A12	The influence of the alternative on the criterion to which it belongs is 30.3%. The influence of the alternative on the achievement of the overall goal is (4.6%).
C5	Interdisciplinary collaboration (14.3%)	Establish joint industry–academia research clusters focused on bio-based value chains.	A13	The influence of the alternative on the criterion to which it belongs is 35.2%. The influence of the alternative on the achievement of the overall goal is (5.0%).

		Develop co-funded PhD and postdoc positions shared between universities and industry labs.	A15	The influence of the alternative on the criterion to which it belongs is 33.5%. The influence of the alternative on the achievement of the overall goal is (4.8%).
		Organize regular interdisciplinary workshops, retreats, and problem-solving sessions focused on bioeconomy challenges.	A14	The influence of the alternative on the criterion to which it belongs is 31.3%. The influence of the alternative on the achievement of the overall goal is (4.5%).
C3	Environmental & climate contribution (14.3%)	Establish institutional monitoring of biodiversity or ecosystem services linked to research activities.	A9	The influence of the alternative on the criterion to which it belongs is 35.9%. The influence of the alternative on the achievement of the overall goal is (5.1%).
		Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices.	A8	The influence of the alternative on the criterion to which it belongs is 33.8%. The influence of the alternative on the achievement of the overall goal is (4.9%).
		Apply environmental impact and carbon assessment tools (LCA, carbon footprinting) to all major research initiatives.	A7	The influence of the alternative on the criterion to which it belongs is 30.3%. The influence of the alternative on the achievement of the overall goal is (4.3%).
C6	Skills development & social engagement (13.3%)	Provide continuous professional development for staff in research management, policy translation, and innovation communication.	A16	The influence of the alternative on the criterion to which it belongs is 37.7%. The influence of the alternative on the

				achievement of the overall goal is (5.0).
		Create internal knowledge-sharing platforms for cross-unit learning and skill development.	A18	The influence of the alternative on the criterion to which it belongs is 31.5%. The influence of the alternative on the achievement of the overall goal is (4.2%).
		Launch community engagement programs such as citizen science, public workshops, or living labs.	A17	The influence of the alternative on the criterion to which it belongs is 30.8%. The influence of the alternative on the achievement of the overall goal is (4.1%).
C2	Sustainable biomass use & circularity integration (12.1%)	Partner with local industries or municipalities to co-develop circular bio-based pilot solutions.	A6	The influence of the alternative on the criterion to which it belongs is 40.6%. The influence of the alternative on the achievement of the overall goal is (4.9%).
		Integrate circular design principles (reuse, recycling, resource efficiency) into project planning and procurement.	A5	The influence of the alternative on the criterion to which it belongs is 32.0%. The influence of the alternative on the achievement of the overall goal is 3.9%.
		Implement internal guidelines for sustainable biomass sourcing and cascading resource use in research projects.	A4	The influence of the alternative on the criterion to which it belongs is 27.4%. The influence of the alternative on the achievement of the overall goal is 3.3%.

g. Participant Feedback

What worked well:

Participants highlighted the high value of the workshop's inclusive structure, which allowed representatives from all four pillars of the Quadruple Helix—Academia, Industry, Government, and Civil Society—to actively participate in creating future activities from their unique professional positions. This collaborative approach was seen as an effective way to integrate diverse expert perspectives into the strategic planning process. The methodology successfully enabled a transition from theoretical discussion to the definition of concrete SMART goals and proposed actions that reflect the real-world needs of the bioeconomy sector

Areas for improvement:

The primary area identified for improvement is the clear necessity for more frequent and regular consultations between all Quadruple Helix representatives to move beyond the current practice of ad hoc or occasional interactions. Participants emphasized the urgent need for greater and more systemic cooperation to foster long-term, formalized partnerships rather than sporadic workshops. Additionally, there is a call to improve communication flows and strengthen the links between university research outputs and their practical application within the industry and government policy frameworks.

h. Documentation





UNIOS Expert Workshop Report

Workshop details:

Date & Time	: 17.2.2026.
Location	: Faculty of Food Technology Osijek, Teams meeting
Number of Participants	: 7

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Faculty leadership, Faculty Management, Professor, PhD student	5
Industry	Representatives of bio-based industry (online consulting)	1
Government		-
Civil Society	Faculty Technical Support Staff Member	1

Summary of Discussion:

Workshop Objectives Achieved:

- Defined HEI's current and aspirational roles in the regional innovation ecosystem.
- Identified institutional internal strengths and weaknesses through SWOT analysis, to guide strategic planning and decision-making.
- Translated institutional SWOT insights into a structured, measurable, and prioritizable strategic framework using TOWS, SMART goals, and AHP methodology.
- Co-developed 10 SMART goals and proposed actions aligned with stakeholder priorities.
- Generated AHP input (5 strategic themes as criteria and 8 action-based alternatives) for prioritisation.

Key Highlights:

- The participatory format of the workshop facilitated cross-departmental dialogue and enhanced alignment between academic, research, and industry engagement objectives.
- Strong consensus among stakeholders on the need for interdisciplinary collaboration.
- Industry representatives underlined the importance of establishing long-term strategic partnerships, increased access to pilot and demonstration infrastructure, and clearer pathways for the commercialization of research results.
- Academic participants highlighted the need for stronger interdisciplinary coordination, improved support for international project preparation, and the development of structured career pathways for early-stage researchers.
- Early career researchers underlined the need to reduce administrative burden and increase professional project management support, allowing greater focus on research productivity and publication output.
- Institutional management representatives stressed the necessity of clear bioeconomy strategy.
- All stakeholder groups agreed on the importance of increasing institutional and regional visibility in the bioeconomy domain through coordinated outreach activities, policy engagement, and participation in international networks.

a. Stakeholder Ecosystem Mapping

Stakeholder Group	Examples	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	Industries, local businesses (agricultural, food), family	Innovation pilot projects, applied research, field trials, technology transfer,	Occasional collaboration in research and projects and professional	Long-term partnerships, "living labs", joint research and

	farms, start-ups	commercialisation, student employment	practice of students, service analyses for industry, PhD students from industry, b	development centers, development of new products and patents, pilot projects in the bioeconomy, targeted research by industry
Government & Policy	Regional development agencies, Ministry of Agriculture, Ministry of Science, local and regional self-government units	Defining the strategic goals of bioeconomy development, harmonizing policies, financing, regulatory support, regional innovation projects	Advisory role, participation in publicly funded projects	Active participation in shaping regional bioeconomy strategies, co-creating policies, securing long-term financing
Academia & Research	Universities, research institutes	Joint projects and interdisciplinary research, knowledge exchange, training and education	Joint projects, co-authorship of publications, informal research exchanges	Structured and coordinated research clusters, shared infrastructure, long-term innovation consortia in the field of bioeconomy
Civil Society & NGOs	Farmers associations, environmental associations, consumer associations, local community	Social acceptance, sustainability, awareness raising	Occasional workshops and events, dissemination activities, surveys, education	Structured programs of public involvement, citizen science, co-creation of solutions
Students & Workforce	Students, alumni network, vocational training centers	Development of human capital and skills, knowledge transfer, strengthening the	Study program and professional practice, participation in events	Enhanced number of students in specialist studies, lifelong learning, industrial

		competitiveness of the bioeconomy		mentored projects, innovation bootcamps, mentoring programs for students and alumni

b. HEI Role Definition

Role Category	Current Role (What the HEI does now)	Aspirational Role (What the HEI should do in the future)
Knowledge Hub	Conducting scientific research, publishing scientific and professional papers, participating in conferences, disseminating project results, occasional workshops and expert lectures for stakeholders	In collaboration with other faculties and institutes, become a regional center of knowledge on bioeconomy; systematically provide expert support to industry, agriculture and the public sector; develop open databases; organize regular expert platforms and advisory services.
Innovation Catalyst	Support for student innovation projects, limited cooperation with industry in the field of innovation, underdeveloped technology transfer system.	Develop pilot plants and demonstration projects; encourage advancement of TRL levels; support bio-based start-ups and spin-offs; develop products in collaboration with industry.
Policy Advisor	Participation in public debates and consultations upon invitation; individual expert contributions.	To be a formally recognized advisor in regional and national bioeconomy, agriculture and circular economy strategies, long-term participation in policymaking, development of science-based guidelines, monitoring and evaluation of the impacts of bioeconomy policies
Capacity Builder	Implementation of the study program (specialist study in the field of bioeconomy), mentoring of young researchers and preparation of doctoral theses in the field of bioeconomy	Development of specialized training programs, lifelong learning and training for the workforce in the bioindustry

Network Connector	Participation in EU projects and consortia, occasional meetings with stakeholders, participation in the BioEast Uni network	Actively act as a bridge between academia, industry and the public sector; initiate strategic partnerships
Sustainability Champion	Implementation of basic sustainability measures at the faculty, research on waste reduction and valorization of by-products	Lead regional circular bioeconomy initiatives, be an example of good practice in sustainable resource management, implement circular models at the university level, measure and reduce environmental footprint

c. SWOT Findings

	HELPFUL	HARMFUL
	STRENGTHS	**WEAKNESSES**
INTERNAL	• Long-standing expertise in food technology, biotechnology, and fermentation processes • Proven experience in research on the valorization of agri/food industry by-products • Highly qualified teaching and research staff with strong scientific track records and internationally recognized expertise • Established connections with the regional agricultural and food production sectors • Existing research teams with experience in implementing national and EU-funded projects • Staff with experience in the evaluation of EU bioeconomy-related projects • Existing laboratory infrastructure upporting both	• Lack of clearly defined and measurable institutional goals and performance indicators • Limited continuity in doctoral career development and level of entrepreneurial initiatives (start-ups and spin-offs) • Insufficient infrastructure capacity for pilot and demonstration facilities (research scaling-up) • Insufficiently structured interdisciplinary approaches • Limited technology transfer and commercialisation mechanisms • Underdeveloped long-term industry partnerships (predominantly project-based collaboration) • High dependence on public funding sources • Limited visibility in the role of a regional bioeconomy advisory hub

	fundamental and applied research in bioeconomy • Education and training of bioeconomy experts through a specialised postgraduate study study program	• Administrative burden and limited research time • Uneven involvement of researchers in innovation-related activities
EXTERNAL	**OPPORTUNITIES**	**THREATS**
	• EU and national policies focused on bioeconomy and circular economy development • Existence of national bioeconomy development strategies • Availability of financial instruments (Horizon Europe, Interreg, Erasmus+, structural and cohesion funds) • Growing industry interest in circular business models, sustainable solutions, and waste valorization • Availability of agricultural biomass and by-products • Opportunities for interdisciplinary collaboration within the University of Osijek • Increasing demand for experts in bioeconomy and the food industry • Demand for scientifically grounded solutions in the food and agricultural industry	• Low motivation among young people to pursue careers in the field of bioeconomy • Insufficient awareness and specialised knowledge among young people regarding bioeconomy opportunities • Limited geographical mobility and willingness to relocate for employment or professional development • Shortage of qualified workforce for bioeconomy-related projects • Limited industry demand for research and scientific support ¸ • Misalignment between scientific objectives and market needs • Strong competition from national and international research institutions in attracting projects and funding • Brain drain of young experts and researchers • Administrative and regulatory complexity in project implementation • Instability of research funding • Limited stakeholder readiness for long-term collaboration

d. Strategic Direction – TOWS Matrix

OPPORTUNITIES	STRENGTHS	WEAKNESSES
	S-O Strategies	**W-O Strategies**
	• Strategically upgrade the existing specialist study program in circular and sustainable bioeconomy by systematically integrating bioeconomy content into all relevant study programs during curriculum revision processes. • Further profile the specialization in circular bioeconomy through the development of lifelong learning and professional training programs aligned with industry needs, responding to the growing demand for qualified experts. • Prioritize the strengthening of research capacities in food production and processing within targeted Horizon Europe calls, with a focus on market-ready solutions and long-term industry collaboration. • Establish an interdisciplinary platform for research in circular bioeconomy within the University of Osijek (leveraging qualified teaching and research staff), aimed at delivering scientifically grounded solutions that integrate knowledge across disciplines and sectors. • Develop and implement joint research and development projects with industry to strengthen	• Strengthening researchers' communication and negotiation competences through structured training, international project collaboration, and active participation in technology transfer and industry cooperation processes. • Use EU-funded projects to secure resources for pilot plants and to structure interdisciplinary research clusters. • Exploit diverse EU funding programs to reduce dependence on national funding sources and improve long-term financial sustainability. • Capitalise on growing industry demand in circular bioeconomy to reinforce technology transfer mechanisms. • Develop structured and long-term cooperation models with industry, relying on best practices such as European research–innovation frameworks and dual education programs. • Become part of international doctoral networks, particularly through Marie Skłodowska-Curie programs, fostering industrial doctorates and interdisciplinary PhD initiatives.

	collaboration, increase industrial engagement in R&D activities, and align scientific expertise with market needs. • Strengthen advisory services and regional development initiatives through recognized expertise, positioning the institution as a key regional partner in shaping and implementing bioeconomy policies.	
THREATS	**S-T Strategies**	**W-T Strategies**
	• Leverage strong knowledge of public policy and regulatory frameworks to anticipate and adapt to upcoming regulatory changes in a timely manner. • Increase international visibility through clearly defined research priorities, thereby reducing competitive pressure from other research institutions. • Utilize proven experience in the implementation and evaluation of EU-funded projects to enhance competitiveness at both national and international levels. • Capitalize on educational expertise to increase awareness and career attractiveness in bioeconomy among young people, addressing the challenge of limited societal awareness. • Use strong research teams and international experience to build a competitive research	• Develop an institutional bioeconomy strategy with clearly defined Key Performance Indicators (KPIs) to improve resilience to funding instability and regulatory complexity. • Diversify funding sources to mitigate the risk of budget reductions resulting from changes in public policies. • Establish a balanced portfolio of research activities, educational programs, industry contracts, and consultancy services to reduce vulnerability to funding and market fluctuations. • Focus research activities on a limited number of strategic priority areas while simultaneously strengthening institutional support for researchers, particularly in project management and administration. • Ensure transparent and efficient institutional governance of research activities to enhance

	environment capable of attracting and retaining young talent. • Expand industry partnerships developed through previous projects to ensure long-term collaboration and alignment between educational programs and evolving market demands. • Develop industrial doctorate programs and structured research career pathways to retain talent and strengthen long-term industry collaboration.	effectiveness, resilience, and long-term sustainability.

e. SMART Goals and Actions

Strategic Directions	SMART Goal Title	Proposed Action	Expected Impact	Responsible Unit
Developing the Bioeconomy at the Institutional Level	Define formal strategic goals in the field of bioeconomy	Develop a formal bioeconomy strategy framework aligned with national and European strategies; define measurable Key Performance Indicators (KPIs)	Clear strategic direction; alignment of research, teaching, and development activities; improved institutional transparency; stronger competitiveness for funding; better positioning within European policy frameworks; enhanced international visibility; systematic quality improvement	Faculty Management

Focused Bioeconomy Research	Define priority research areas	Identify and formally adopt three priority research areas: • Valorization of agri-food industry by-products • Sustainable proteins and novel foods • Bioeconomy for rural and regional development	Clear research focus; increased competitiveness in project applications	Faculty Management; Office for Projects, Office for Quality Control
Strengthening Project Performance	Increase in the number of project applications in the field of bioeconomy	Systematically develop and submit national and EU project proposals aligned with defined focus areas	Higher funding success rate; increased international visibility	Research Teams, Office for Projects, Office for Quality Control
Strengthening Technology Transfer	Improvement of technology transfer and commercialisation of research results	Establish a structured innovation program to support innovations in the field of bioeconomy	Increased number of industry contracts, development of spin-off or start-up companies	Faculty Management
Development of Research Infrastructure	Establishment of pilot and demonstration capacities	Prepare and implement projects for acquisition and development of pilot equipment (TRL 4–6)	Enabled scaling of research and applied development	Faculty Management; Research groups
Strengthening Cooperation with Industry	Establishment of strategic partnerships with the food and bio-based industries	Clearly define joint research and development priorities	Increased research application and technology transfer; strengthened	Faculty Management; Research groups; Industry partners

			strategic partnerships	
Human Capacity Development	Development of education and lifelong learning programs in the field of bioeconomy	Introduce new study modules, short courses, and industry-mentored projects	Higher employability; strengthened workforce capacity; reduced outflow of young researchers; improved visibility of bioeconomy career pathways	Faculty Management
Organisational Strengthening of the Research System	Strengthening of the institutional structures, processes and support mechanisms with to enhance efficiency and sustainability of research activities	Establishment of a coordinating body for planning, monitoring and evaluation of research activities	Reduced fragmentation; more efficient strategy implementation	Faculty Management
Increasing Research Productivity	Improvement of project management support	Establish a centralized project support unit	Reduced administrative burden on researchers; increased research productivity; professionalized project management; higher project application success rate	Faculty Management
Enhancing Visibility and Policy Advisory Role	Strengthening of institution's role as a regional advisor in bioeconomy	Actively participate in policy development; support institutional bioeconomy positioning; organize an	Stronger regional development role; positioning as a reference center of expertise; increased institutional	Faculty Management

		annual stakeholder forum	influence on public policy; expanded stakeholder network and partnerships	

f. AHP Inputs

Code	Criteria	Action-based Alternative	Code	Description
C1	Innovation and investment scale-up	Development of pilot and demonstration infrastructure	A1	Establishment of pilot and demonstration capacities to validate and accelerate technology advancement from TRL 3-4 to TRL 6-8.
C4	Economic impact & competitiveness	Internal system for technology transfer and commercialisation of innovations	A10	Improve cooperation with the Technology Transfer Office. Management of intellectual property. Develop an institutional IP strategy.
		Entrepreneurial support programs	A11	Provide training for researchers in patent protection and commercialisation.
C5	Interdisciplinary collaboration	Partnership Development	A14	Establishment of collaboration between industry and academia in the field of bioeconomy.
		Joint research	A15	Organisation of regular interdisciplinary workshops and seminars between industry and academia.
C6	Skills development & social engagement	Development of interdisciplinary educational programs	A16	Provide continuous professional development for staff in research management, policy translation, and innovation communication. Development and integration of interdisciplinary teaching

				modules in the field of bioeconomy.
C7	Early career researcher support	Performance evaluation	A20	Establishment of career development programs that reward the achievements and leadership of young researchers.
		Skills development	A21	Provide training for writing and implementing projects.

g. Participant Feedback

What worked well:

- Key analyses (SWOT, TOWS, SMART goals, and AHP framework) were partially prepared in advance through individual consultations with selected stakeholders. This allowed the workshop discussion to be more focused, structured, and productive, as participants reacted to already-developed analytical inputs rather than starting from scratch.
- The structured approach facilitated a logical progression from analysis to action planning, resulting in clearly defined strategic priorities and actionable outcomes.
- Bringing together representatives from academia and industry created space for constructive exchange and improved mutual understanding of expectations and constraints.

Areas for improvement:

- The integration of multiple analytical tools (SWOT, TOWS, SMART, and AHP) made the process conceptually dense and demanding, limiting the time available for deeper discussion of each component.
- The introduction of quantitative prioritization methods required additional explanation, which reduced the time available for substantive strategic dialogue.

- Due to the comprehensive scope, further workshops or working group meetings will be necessary to operationalize the identified priorities fully.

h. Documentation





UNSFA Expert Workshop Report

Workshop Details:

Date & Time	: 2026.02.25. 10:00
Location	: UNSFA, Hybrid
Number of Participants	: 12 (11 onsite, 1 online)

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Senior researchers, postdoctoral researchers	5, (online 1)
Industry	representatives of biotechnology companies	3
Government	Fund for European Affairs and Development of the Autonomous Province of Vojvodina (FEP)	2
Civil Society	Hunters Associations	1

Summary of Discussions

Workshop Objectives Achieved:

We looked at UNSFA's role in the national and European bioeconomy and sustainable agri-food scene. We focused on areas that are important right now, like sustainable livestock, circular bioeconomy, alternative proteins including insect-based feed, biogas, applied research, and working with international partners.

We then got input from industry, researchers, and other stakeholders to understand what we do well, where we could improve, and what

opportunities or challenges we face. This gave us a realistic picture of the institution.

From that, we set out clear goals. We came up with seven SMART objectives to improve research, boost innovation, share knowledge, participate in international projects, and work more closely with industry.

We grouped these goals into four main areas (research and innovation, education and training, infrastructure, and working with stakeholders) and started identifying practical steps to move forward.

Finally, we discussed and reflected on these priorities together to make sure they fit with UNSFA's long-term vision and the needs of the regional agricultural community.

Key Highlights:

People agreed that UNSFA could benefit a lot from closer collaboration across its departments and research teams, especially in areas like biogas, sustainable livestock, circular bioeconomy, and alternative feed sources.

Industry representatives made it clear that better communication and knowledge sharing are needed. They suggested creating pilot projects, demonstration farms, or joint research initiatives.

Academia representatives focused on the need to modernize industry-involved teaching. They highlighted hands-on, research-based learning, including new topics like sustainable feed and efficient resource use, and emphasized raising UNSFA's international profile through collaborative projects and student/faculty mobility.

The session itself encouraged everyone to contribute ideas openly, debate priorities, and collectively shape the strategic directions,

making sure that the outcomes reflected the shared vision of both staff and external partners.

a. Stakeholder Ecosystem Mapping

Stakeholder Group	Examples	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	- Feed manufacturers - Livestock producers (poultry, swine, dairy) - Biogas plants - Agri-food processing companies - Insect production startups	Application partners for applied R&D, pilot trials, innovation validation, internships, and technology transfer	Project-based collaboration, student internships, individual consultancy, participation in research trials	Long-term strategic R&D partnerships, joint pilot/demonstration units, co-funded PhD positions, industry-linked curricula, structured innovation platforms
Government & Policy	- Ministry of Agriculture, Forestry and Water Management (Serbia) - Ministry of Science, Technological Development and Innovation - Provincial Secretariat for Agriculture (AP Vojvodina)	Funding frameworks, regulatory support, policy alignment, implementation of sustainable agriculture and bioeconomy strategies	Participation in consultations, national projects, expert opinions, and working groups	Evidence-based advisory role, joint development of regional bioeconomy initiatives
Academia & Research	- University of Novi Sad faculties - University of Belgrade Faculty of Agriculture	Education, fundamental and applied research, and research	Joint research projects, co-authored publications,	Industry-integrated doctoral and master programs, shared research infrastructure,

	- Institute for Animal Husbandry - International partners (Erasmus+/Horizon Europe networks)	infrastructure sharing	and mobility programs	regional training hubs in sustainable livestock and bioeconomy
Civil Society & NGOs	- Farmer associations - Cooperatives - Rural development NGOs - Sustainability networks	Ensuring practical validation of innovations, dissemination, and capacity building	Demonstration trials, outreach events, workshops, advisory activities	Living labs, participatory research models, and long-term demonstration farms
Students & Workforce	- Student organisations (e.g., agriculture student associations) - Young researcher networks	innovation culture development, development of bioeconomy-relevant knowledge and skillsets	Participation in conferences and field days, workshops tailored for students	mentoring, training programs with industry, and entrepreneurship support

b. HEI Role Definition

Role Category	Current Role (What the HEI does now)	Aspirational Role (What the HEI should do in the future)
Knowledge Hub	UNSFA provides strong expertise in animal science, crop production, feed technology, agroecology, and sustainable farming systems. Research is particularly recognized in sustainable livestock nutrition and alternative feed resources	Enhance capacities related to bioeconomy research areas, establish clearer thematic clusters (e.g., sustainable livestock systems, circular nutrient management, alternative proteins)
Innovation Catalyst	UNSFA collaborates with farms, feed manufacturers, and agri-food companies	Increase the institutional impact in the agri-food and bioeconomy innovation area

	through research projects, pilot trials, and consultancy. Technology transfer activities exist but are not yet strategically structured at the faculty level	
Policy Advisor	Individual experts considerably contribute to national working groups, regulatory discussions, and sectoral consultations in agriculture and livestock production	Increase UNSFA's recognition as an institutional advisor in national and regional bioeconomy and sustainable agriculture strategies
Capacity Builder	UNSFA offers comprehensive study programs in agriculture and animal sciences, including practice-oriented teaching and cooperation with industry partners. Curriculum updates occur periodically, but structured industry feedback mechanisms are limited	Develop industry and bioeconomy-related study programs
Network Connector	UNSFA participates in Erasmus+, Horizon Europe, COST Actions, and regional research networks	Connecting with relevant players in the bioeconomy ecosystem in the EU and beyond
Sustainability Champion	Bioeconomy is embedded in several research and teaching activities (e.g., resource efficiency, nutrient use efficiency, alternative protein sources), but there is no fully integrated institutional bioeconomy strategy	Serve as a model of good practice in sustainable resource management; systematically measure and reduce environmental footprint

c. SWOT Findings

	HELPFUL	HARMFUL
INTERNAL	**STRENGTHS**	**WEAKNESSES**
	● Rationalization of research infrastructure utilisation ● Strong expertise in agrifood, bioenergy, and science-policy communication ● Strong interdisciplinary collaboration. ● Established EU-funded research networks ● Industry partnerships and technology transfer ● Infrastructure: key infrastructure capabilities for sustainable farming and biogas	● Unfavorable ratio of research-teaching time ● Weak industry linkages in some institutions ● Low integration of digital and AI-based bioeconomy solutions ● Bureaucratic inefficiencies and regulatory complexity ● Limited mentorship and knowledge transfer for early-career researchers ● Low number of PhD students
EXTERNAL	**OPPORTUNITIES**	**THREATS**
	● Rising number of HE projects and better understanding of funding ideas ● Stronger ideation for nationally funded projects in the bioeconomy ● Strengthening public-private partnership and academia-industry collaboration. ● Digitalization and AI integration in bioeconomy research. ● International research collaborations and knowledge exchange. ● New bioeconomy hub in Serbia, "BIO4 Campus," gives a lot of opportunities to explore deeper collaboration	● Regulatory fragmentation and policy misalignment ● Competitive disadvantages in research projects for Widening countries ● Talent-drain and limited research capacity ● Slow adoption of industry-driven bioeconomy solutions ● Lack of a national policy framework for the bioeconomy

d. Strategic Direction – TOWS Matrix

	STRENGTHS	WEAKNESSES
OPPORTUNITIES	**S-O Strategies**	**W-O Strategies**
	● Strengthening industry partnerships and technology transfer to enhance academia-industry collaboration ● Utilize institutional expertise to strengthen international research collaboration and knowledge exchange	● Enhancing international research collaboration to improve knowledge transfer for early-career researchers ● Leverage the increasing demand for sustainable and circular bioeconomy solutions to expand doctoral programs and attract new PhD candidates
THREATS	**S-T Strategies**	**W-T Strategies**
	● Strong interdisciplinary collaboration to overcome regulatory fragmentation and policy misalignment ● Use efficient research infrastructure and institutional expertise to support the development of bioeconomy policies and mitigate risks from the lack of national regulatory frameworks	● Leveraging partnerships with expert and regulatory bodies to enhance effective industrial bioeconomy solutions ● Improve research–teaching allocation to mitigate talent drain and limited research capacity

e. SMART Goals and Actions

Strategic Directions	SMART Goal Title	Proposed Action	Expected Impact	Responsible Unit
Strengthening industry partnerships and technology	Establish new partnerships with industry	Identify and approach potential industry partners relevant	Increased number of active collaborations between	International Relations and

transfer to enhance academia-industry collaboration		to bioeconomy research Organize joint workshops, seminars, and innovation projects	academia and industry; Strengthened the visibility and reputation of the university in the industry sector	Project Office, UNSFA Departments
Enhancing international research collaboration to improve knowledge transfer for early-career researchers	Strengthening exchange programs	Develop and promote exchange programs for early-career researchers. Launch joint research projects targeting key bioeconomy challenges Identify and engage international partner institutions relevant to bioeconomy research	Increased international collaboration and networking opportunities for early-career researchers; Improved skills and expertise of young researchers through exposure to international best practices; Enhanced transfer of knowledge between institutions and research teams	University, International Relations and Project Office, UNSFA Departments
Strong interdisciplinary collaboration to overcome regulatory fragmentation and policy misalignment	Establish interdisciplinary collaboration in the field of bioeconomy	Identify relevant academic departments, research centers, and faculties to participate in interdisciplinary teams	Enhanced the capacity of researchers to address complex bioeconomy challenges	UNSFA Departments

		Develop integrated research projects addressing regulatory and policy challenges in the bioeconomy		
Leveraging partnerships with expert and regulatory bodies to enhance effective industrial bioeconomy solutions	Establish new research partnerships with expert and regulatory bodies in the field of regulatory policies related to the bioeconomy	Identify relevant NGOs and expert bodies working on bioeconomy regulatory policies. Share knowledge, data, and best practices through collaborative platforms	Strengthened networks between academia and expert/regulatory bodies; Increased research output and innovation in the bioeconomy sector	UNSFA Departments
Utilize institutional expertise to strengthen international research collaboration and knowledge exchange	Expand international research collaboration in agrifood and bioenergy	Identify leading international institutions active in agrifood and bioenergy research Apply jointly for international research funding (e.g., Horizon Europe or similar programs)	Stronger global visibility and recognition of institutional expertise; Increased number of international research projects and publications	University, International Relations and Project Office, UNSFA Departments
Leverage the increasing demand for sustainable and	Increase the number of PhD students in sustainable	Promote career opportunities in	Increased number of enrolled PhD students in	University, International Relations and Project Office,

circular bioeconomy solutions to expand doctoral programs and attract new PhD candidates	and circular bioeconomy programs	academia and industry for PhD candidates Establish partnerships with industry and international institutions to co-supervise PhD research	bioeconomy fields; Improved attractiveness of the institution for prospective graduate students	UNSFA Departments
Use efficient research infrastructure and institutional expertise to support the development of bioeconomy policies and mitigate risks from the lack of national regulatory frameworks	Support the development of national bioeconomy policy through evidence-based research	Disseminate findings through publications, conferences, and seminars Develop policy briefs and recommendations based on research findings Organize workshops and roundtables with policymakers and industry stakeholders	Enhanced influence of the institution on shaping national bioeconomy strategies; Optimized use of research infrastructure in strategic, policy-relevant projects	University, UNSFA management, UNSFA Departments

Improve research–teaching allocation to mitigate talent drain and limited research capacity	Optimize faculty workload to retain talent and strengthen research capacity	Implement flexible teaching schedules to allow more dedicated research time Promote joint research projects with industry and international partners to increase capacity	Reduced talent drain and higher retention of skilled researchers; Improved balance between teaching responsibilities and research activities; Stronger collaboration across departments and with external partners	University, UNSFA management, UNSFA Departments

f. AHP Inputs

Code	Criteria	Action-based Alternative	Code	Description
C1	**Innovation and investment scale-up**	EU Project Positioning	A1	Active participation in Horizon Europe consortia, COST Actions, CBE JU initiatives, and ERA platforms to increase coordination roles and scale up funding
C2	**Sustainable biomass use & circularity integration**	Nutrient Circularity and Residue Valorisation	A6	Develop pilot systems for nutrient recycling (N, P recovery), manure management, and crop-residue valorisation in collaboration with regional stakeholders.

C3	**Environmental & climate contribution**	Climate-Smart Production Systems	A9	Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance.
C6	**Skills development & social engagement**	Launch and test pilot bioeconomy courses	A16	Introduce pilot courses on circular bioeconomy, sustainable feed systems, climate-smart agriculture, and innovation management.
C7	**Knowledge Transfer & Innovation Capacity**	Seed & Mobility Support	A22	Establish internal seed funding and short-term mobility grants to support early-career-led pilot research and international networking.

g. Participant Feedback

What worked well:

- The fact that most participants were physically present at the Faculty created a very constructive working atmosphere. The discussion was open and dynamic, and it was easier to exchange views and clarify ideas in person.
- The colleague who joined online was fully included in the discussion. The technical setup worked without major issues, and the hybrid format did not limit their contribution.
- The structured approach (moving step by step from analysis toward defining concrete actions) helped keep the discussion

focused. It was useful for narrowing broader institutional reflections into more realistic, achievable priorities for UNSFA.

- The whiteboard helped collect ideas in one place. Participants could immediately see comments and suggestions, which supported transparency and made it easier to agree on key points.

Areas for improvement:

- The workshop was quite intensive. Covering analysis, prioritisation, and action planning within one session required a high level of concentration.
- Because of time limitations, some topics could not be discussed in as much detail as originally planned. For this reason, the shared board remained open after the workshop so that participants could add further comments and refine the proposed actions.
- In the future, it might be useful to either slightly extend the duration or divide the process into two shorter meetings to allow more time for discussion and validation of the final action plans.

h. Documentation

Invitation with Agenda:

Predmet: Poziv za ekspertsku radionicu – Bioekonomija

Poštovani,

Pozivamo Vas da učestvujete u ekspertskoj radionici u okviru BEAMING zadatka 6.1, posvećenoj razvoju istraživačkih akcionih planova u oblasti bioekonomije.
U sredu **25.02.2025. U 10č**, Poljoprivredni fakultet, stočarski paviljon 2 sprat.

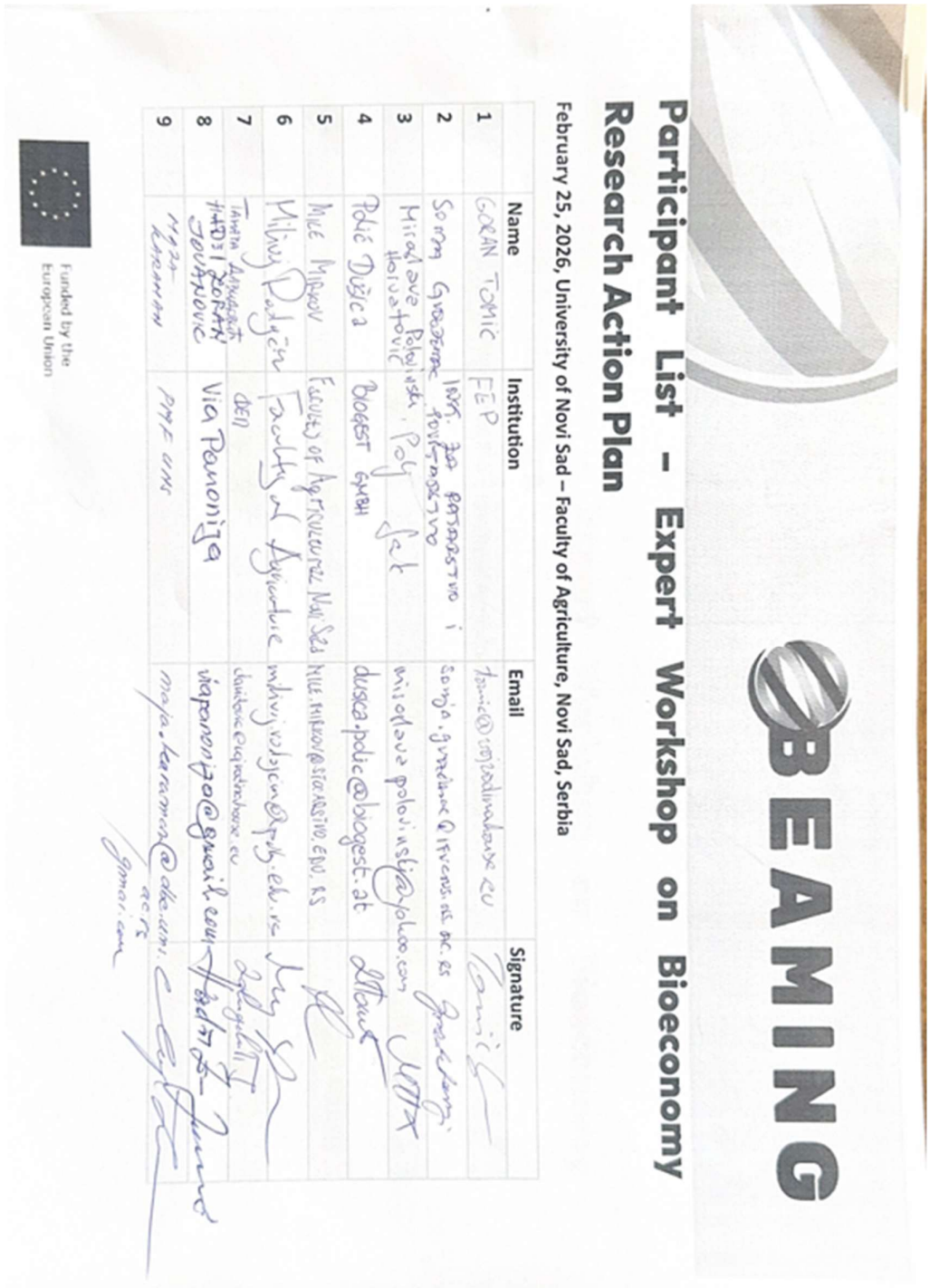
Cilj radionice je definisanje istraživačkog fokusa, identifikovanje institucionalnih prioriteta i formulisanje SMART ciljeva kao osnove za dalju prioritizaciju aktivnosti.

Biće nam zadovoljstvo da svojim učešćem doprinesete ovom procesu.

Agenda
10.00–10.15
Dobrodošlica i uvod; kontekst bioekonomije VŠU i uloga u lokalnom inovacionom ekosistemu
10.15–11.00
SWOT i TOWS analiza
11.00–12.00
Zajedničko kreiranje SMART ciljeva i predloga aktivnosti
12.00–12.30
Pauza
12.30–13.30
Diskusija o AHP kriterijuma i alternativa; rezime, povratne informacije i naredni koraci
13.30
Ručak

S poštovanjem,
UNSFA BEAMING tim

List of participants:



BEAMING

Participant List – Expert Workshop on Bioeconomy Research Action Plan

February 25, 2026, University of Novi Sad – Faculty of Agriculture, Novi Sad, Serbia

	Name	Institution	Email	Signature
1	GORAN TOMIĆ	FEP	[illegible]	
2	Sonja Gvozdenac	Inst. za pov. poljopr.	sonja.gvozdenac@ifvcns.ns.ac.rs	
3	Miroslave Polovinski Horvatović	Poly Lab	miroslave.polovinski@yahoo.com	
4	Duška Đurić	Biogest GmbH	duska.djuric@biogest.at	
5	Mile Mirkov	Faculty of Agricultural Novi Sad	mile.mirkov@stanarstvo.edu.rs	
6	Milivoj Poljčin	Faculty of Agriculture	milivoj.poljcin@polj.edu.rs	
7	Tamara Aleksandrov Hadži Jovanović	DEN	tamara.aleksandrov@den.rs	
8	Zoran Jovanović	Via Panonija	viapanonija@gmail.com	
9	Maja Karaman	PMF UNS	maja.karaman@dbe.uns.ac.rs	

Funded by the European Union

BEAMING

Participant List – Expert Workshop on Bioeconomy Research Action Plan

February 25, 2026, University of Novi Sad – Faculty of Agriculture, Novi Sad, Serbia

	Name	Institution	Email	Signature
11	Tamara Travšić	DOO, CENTAR ZA UNAPREĐENJE LOVSTVA I LOVNOG TURIZMA, NS	tamara.travsic@stacionarno.edu.rs	Tamara Travšić
12				
13				
14				
15				
16				
17				

Funded by the European Union

Photos:





UP Expert Workshop Report

Workshop Details:

Date & Time : 29. April 2026
Location : Veszprém, online
Number of Participants : 7

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Researchers	3
Industry	Engineers	2
Government	Head of Department	1
Civil Society	Head of NGO	1

Summary of Discussion

Workshop Objectives Achieved:

The University of Pannonia (UP) has established itself as a significant regional actor in advancing the transition towards a sustainable and circular bioeconomy in Hungary and Central Europe. Its bioeconomy-related research activities are built upon strong interdisciplinary foundations that integrate environmental sciences, agricultural sciences, engineering, economics, sustainability studies, circular economy concepts, and innovation management. The university's bioeconomy research focus primarily addresses the sustainable utilization of biological resources, circular value chains, resource efficiency, sustainable food systems, environmental management, renewable materials, waste valorization, and the socio-economic dimensions of sustainable transitions.

Within the local and regional innovation ecosystem, the University of Pannonia plays a bridging role between academia, industry, policymakers, and civil society organisations. Through its collaboration with agricultural producers, food-processing companies, environmental technology firms, local governments, chambers of commerce, and international research networks, the university

contributes to knowledge transfer, innovation diffusion, and evidence-based policymaking. As a knowledge hub in the Transdanubian region, UP supports regional smart specialization strategies and promotes sustainable development pathways aligned with European Green Deal objectives and the EU Bioeconomy Strategy.

a. Stakeholder Ecosystem Mapping

Stakeholder Group	Examples	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	Agricultural producers, food-processing companies,	Innovation Catalyst, Network Connector, Knowledge Hub	Collaboration through research projects, internships,	Establish long-term strategic partnerships, co-create innovation projects, develop living labs and demonstration sites
Government & Policy	Local municipalities, regional development agencies, ministries, national innovation agencies,	Policy Advisor, Sustainability Champion, Network Connector	Participation in policy-related projects, expert consultations, and regional development initiatives.	Become a recognized evidence-based advisor for bioeconomy and sustainability policies, contribute to policy design and evaluation, support regional bioeconomy strategies
Academia & Research	Hungarian and international universities, research institutes, Horizon Europe consortia, EIT communities,	Knowledge Hub, Capacity Builder, Network Connector	Joint research projects, scientific publications, academic mobility, and conference participation.	Strengthen interdisciplinary and international collaboration, coordinate large-scale research consortia, establish joint doctoral programmes, and create a

				regional bioeconomy knowledge network
Civil Society & NGOs	Environmental NGOs, community organisations, farmers' associations, consumer groups, sustainability advocacy organisations	Sustainability Champion, Policy Advisor, Capacity Builder	Involvement in selected projects, awareness-raising activities, and stakeholder workshops.	Develop systematic engagement mechanisms, co-create solutions for local sustainability challenges, involve NGOs in research and education activities, and strengthen societal awareness of bioeconomy concepts.
Students & Workforce	Undergraduate and postgraduate students, doctoral candidates, vocational learners, professionals seeking upskilling, regional workforce	Capacity Builder, Knowledge Hub, Innovation Catalyst	Formal education programmes, internships, research participation, and professional training activities.	Expand interdisciplinary bioeconomy education, offer micro-credentials and lifelong learning programmes, increase student involvement in living labs and innovation projects, and strengthen links between education and labor market needs.

b. HEI Role Definition

Role Category	Current Role (What the HEI does now)	Aspirational Role (What the HEI should do in the future)
Knowledge Hub	Generates scientific knowledge through interdisciplinary research in sustainability, circular economy, environmental management, agricultural innovation, and socio-economic aspects of sustainable transitions.	Become a recognized regional and international reference center for bioeconomy knowledge, integrating research across faculties and providing evidence-based solutions for societal, environmental, and economic challenges.
Innovation Catalyst	Supports innovation through applied research projects and collaborations with businesses, local authorities, and research organisations. Contributes to technology transfer and sustainable development initiatives.	Act as a leading catalyst for bioeconomy innovation by facilitating living labs, demonstration projects, start-ups, spin-offs, and the commercialization of bio-based solutions in collaboration with industry partners.
Policy Advisor	Provides scientific expertise to regional stakeholders and contributes to policy discussions through research projects and expert participation in professional networks.	Become a trusted advisor for regional, national, and European policymakers by delivering evidence-based recommendations, foresight studies, and strategic guidance on bioeconomy and sustainability transitions.
Capacity Builder	Educates students and researchers in sustainability-related disciplines and develops human capital through higher education and research training.	Expand bioeconomy education through interdisciplinary curricula, lifelong learning programmes, professional training, and skills development initiatives that address emerging labor market needs.
Network Connector	Maintains relationships with regional stakeholders, research partners, public institutions, and international academic networks. Facilitates collaboration within individual projects and initiatives.	Serve as the central connector of the regional bioeconomy ecosystem by coordinating multi-actor partnerships among academia, industry, government, civil society, and international organisations.

Sustainability Champion	Promotes sustainability principles through research, education, and engagement activities related to circular economy, resource efficiency, and environmental protection.	Lead regional sustainability and bioeconomy transitions by demonstrating best practices, promoting responsible innovation, supporting climate-neutral development, and fostering societal awareness of sustainable lifestyles and production systems.

c. SWOT Findings

	HELPFUL	HARMFUL
	STRENGTHS	**WEAKNESSES**
INTERNAL	• String interdisciplinary expertise • Established research networks • Regional stakeholder relationship • Sustainability and Circular Economy Competences	• Fragmented Research Activities • Limited Critical Mass in Bioeconomy Branding • Insufficient Cross-Faculty Coordination • Resource Constraints
	OPPORTUNITIES	**THREATS**
EXTERNAL	• Growing European Policy Support • Increasing Demand for Sustainable Solutions • Emerging Bio-Based Industries • Regional Leadership Potential	• Limited Awareness of Bioeconomy Concepts • Regulatory and Market Uncertainties • Competition for Research Funding • Need for Behavioral and Cultural Change

d. Strategic Direction – TOWS Matrix

	STRENGTHS	WEAKNESSES
OPPORTUNITIES	**S-O Strategies**	**W-O Strategies**
	• Strong interdisciplinary expertise: Develop large-scale interdisciplinary Horizon Europe and national bioeconomy projects aligned with Green Deal priorities. • Established research networks: Expand participation in European bioeconomy partnerships, living labs, and innovation ecosystems.	• Fragmented research activities: Use European funding opportunities to create integrated interdisciplinary bioeconomy programmes. • Limited critical mass in bioeconomy branding: Build a recognizable institutional bioeconomy identity linked to regional leadership ambitions.

THREATS	• Regional stakeholder relationships: Create regional bioeconomy innovation hubs connecting academia, industry, and policymakers. • Sustainability and Circular Economy competences: Position UP as a regional leader in circular bioeconomy solutions and sustainable transition strategies.	• Build a recognizable institutional bioeconomy: Establish cross-faculty working groups and thematic clusters supported by external projects. • Resource constraints: Utilize growing policy support and external funding to strengthen infrastructure and human capacities.
	S-T Strategies	**W-T Strategies**
	• Promote evidence-based bioeconomy solutions and awareness campaigns using multidisciplinary expertise. • Leverage international networks to anticipate regulatory changes and share best practices. • Strengthen stakeholder engagement to reduce resistance to change and increase bioeconomy acceptance. • Support stakeholders in adapting to regulatory and market uncertainties through research-based guidance.	• Fragmentation may weaken competitiveness for funding and reduce visibility in a highly competitive environment. • Low visibility may result in missed partnerships and reduced influence on regional bioeconomy development. • Lack of coordination may hinder responses to rapidly evolving policy and market requirements. • Resource limitations may reduce the university's ability to compete successfully for funding and attract talent.

e. SMART Goals and Actions

Strategic Directions	SMART Goal Title	Proposed Action	Expected Impact	Responsible Unit
Internal mapping	Establish a University of Pannonia Bioeconomy Research and Innovation Platform by the end of 2027.	• Map all bioeconomy-related research activities across faculties. • Create an interdisciplinary bioeconomy working group.	• Platform established. • Minimum 30 researchers involved. • At least 5 interdisciplinary project proposals submitted annually	UP Circular Ecnomoy Competence Center and Faculty of Business Economics

		• Develop a shared institutional bioeconomy strategy. • Organize annual internal bioeconomy networking events.		
External partnership	Increase external bioeconomy partnerships by 50% by 2028	• Develop a stakeholder database. • Organize regional bioeconomy stakeholder forums. • Establish collaboration agreements with industry and public-sector partners. • Participate actively in European bioeconomy networks.	• Number of formal partnerships. • Number of joint projects. • Number of stakeholder engagement activities.	UP Project office and Technology Transfer Office
Research outputs	Increase interdisciplinary bioeconomy research outputs by 30% by 2028	• Launch internal seed-funding calls. • Support cross-faculty research teams. • Create interdisciplinary doctoral opportunities. • Facilitate collaborative publication initiatives.	• Joint publications. • Interdisciplinary project proposals. • Co-supervised doctoral theses.	Researchers related to bioeconomy
	Strengthen bioeconomy education and	• Review existing curricula.	• Number of revised courses.	Course leaders

Educational capacity building	capacity building by integrating bioeconomy-related content into at least 5 academic courses by 2028	• Develop new bioeconomy teaching modules. • Organize staff training workshops. • Engage external practitioners in teaching activities.	• Student participation rates. • Staff training completion rates.	

f. AHP Inputs

Code	Criteria	Action-based Alternative	Code	Description
C1	Contribution to university mission and regional development	Mapping of the extisting collaborations and extend them	A1	Potential to strengthen bioeconomy research, innovation, and societal outcomes.
		Establish a Bioeconomy Research and Innovation Platform	A2	Enhance presence of the bioeconomy related outcomes at regional level.
		Organize annual stakeholder forums	A3	Arranging forums with stakeholders
C2	Create an interdisciplinary bioeconomy working group	Create groups at different faculties	A1	The multidisciplinary enhances the impact of the activities.
		Launch internal seed-funding schemes	A2	Templates for cooperations.
		Establish industry co-creation and demonstration projects	A3	Launch common projects with companies.
C3	Develop interdisciplinary educational modules	Mapping existing curricula	A1	Mapping results from the curricula
		Develop further the existing ones	A2	Use the existed list and extend it.
		Involvement of companies	A3	Via stakeholders forums

C4	Strengthen international bioeconomy partnerships	Mapping the partners	A1	Ongoing and past project partners mapping
		Extend the partnerships from other faculties	A2	Involvement of other faculties.
		Extend the partnership from other countries, from other ongoing projects	A3	From projects and conferences.
C5	Develop a university-wide bioeconomy strategy (BS)	Mapping the possibilities (already existed documentations, curricula)	A1	Use the results above.
		Negotiation with the Deans and the Rector	A2	
		Preparation of the BS	A3	Involve members from every faculty.

g. Participant Feedback

What worked well:

The starting point was challenging, as participants came from different disciplinary backgrounds and often had varying interpretations of what bioeconomy means in practice. However, once a common understanding and shared knowledge base had been established, the discussions became much more productive and forward-looking.

This common ground enabled participants to move beyond definitions and begin identifying the real needs, opportunities, and priorities for the University of Pannonia within the bioeconomy domain. The discussions highlighted the importance of strengthening interdisciplinary collaboration across faculties, connecting existing research activities under a more coherent bioeconomy framework, and enhancing cooperation with external stakeholders, including industry, policymakers, local authorities, and civil society organizations.

The process also revealed that while the University of Pannonia possesses considerable expertise in sustainability, circular economy, environmental management, agricultural innovation, and socio-economic aspects of sustainable transitions, these capacities are often fragmented and not always recognized as part of a broader bioeconomy agenda. Therefore, there is a clear need to improve internal coordination, increase the visibility of bioeconomy-related activities, and create platforms that facilitate knowledge exchange among researchers and stakeholders.

Furthermore, the discussions confirmed that bioeconomy remains an emerging and sometimes underestimated topic in the region. This creates both a challenge and an opportunity for the university. On the one hand, awareness among stakeholders needs to be increased; on the other hand, the University of Pannonia is well positioned to take a leading role in shaping regional bioeconomy development through research, education, innovation, and stakeholder engagement.

Building upon the shared understanding achieved during the discussions, the next step is to formulate clear and measurable objectives, identify practical actions, and prioritize them according to their expected impact, feasibility, and strategic relevance. This will ensure that future activities support both the university's institutional ambitions and the broader needs of the regional bioeconomy ecosystem.

Areas for improvement:

1. Strengthening Institutional Coordination of Bioeconomy Activities

Although numerous bioeconomy-related initiatives exist across faculties and research groups, they are often implemented independently. A stronger institutional framework could improve visibility, resource sharing, and interdisciplinary cooperation.

Possible actions:

- Establish a University Bioeconomy Coordination Platform.

- Create an internal database of bioeconomy-related expertise and projects.
- Organize regular cross-faculty networking events.
- Develop a university-wide bioeconomy strategy.

Expected outcomes:

- Improved internal collaboration.
- Increased interdisciplinary project generation.
- Stronger institutional identity in bioeconomy research.

2. Enhancing Interdisciplinary Research Capacity

Bioeconomy challenges require the integration of environmental, technological, agricultural, economic, and social sciences. Current collaborations could be expanded and formalised.

Possible actions:

- Launch interdisciplinary seed-funding schemes.
- Support joint doctoral supervision across faculties.
- Develop thematic research clusters around bioeconomy challenges.
- Introduce incentives for interdisciplinary publications and project proposals.

Expected outcomes:

- Higher-quality research outputs.
- Increased success in Horizon Europe and other international calls.
- Stronger research excellence and innovation capacity.

3. Increasing Stakeholder Engagement and Co-Creation

The university could further strengthen its role as a facilitator between academia, industry, policymakers, and society.

Possible actions:

- Establish a Bioeconomy Stakeholder Advisory Board.
- Organize annual regional bioeconomy forums.
- Develop Living Labs and demonstration projects.

- Engage stakeholders in curriculum development and research planning.

Expected outcomes:

- Better alignment of research with societal needs.
- Increased technology transfer and innovation uptake.
- Stronger regional impact.

4. Improving Visibility and Communication of Bioeconomy Activities

Many stakeholders are not fully aware of the university's contributions to bioeconomy and sustainability transitions.

Possible actions:

- Develop a dedicated bioeconomy communication strategy.
- Create a bioeconomy web portal showcasing projects and expertise.
- Publish annual impact reports.
- Increase participation in international bioeconomy platforms.

Expected outcomes:

- Enhanced reputation and recognition.
- Increased collaboration opportunities.
- Greater attractiveness for students and researchers.

5. Expanding Bioeconomy Education and Skills Development

Future bioeconomy transitions require highly skilled professionals with interdisciplinary competencies.

Possible actions:

- Integrate bioeconomy topics into existing curricula.
- Develop new interdisciplinary courses and micro-credentials.
- Strengthen industry participation in teaching activities.
- Offer lifelong learning programmes for professionals and policymakers.

Expected outcomes:

- Better workforce preparedness.

- Increased student engagement.
- Stronger links between education and labor market needs.

6. Strengthening International Collaboration

International networks are essential for accessing knowledge, funding, and best practices.

Possible actions:

- Join additional European bioeconomy networks and partnerships.
- Develop strategic collaborations with leading bioeconomy universities.
- Increase researcher mobility and exchange programmes.
- Coordinate international project consortia.

Expected outcomes:

- Greater international visibility.
- Improved funding success.
- Access to cutting-edge knowledge and infrastructure.

7. Supporting Innovation, Commercialization and Entrepreneurship

Research results should increasingly be translated into practical applications and market solutions.

Possible actions:

- Support bioeconomy start-ups and spin-offs.
- Develop industry-academia innovation projects.
- Strengthen intellectual property management.
- Create pilot and demonstration facilities.

Expected outcomes:

- Increased innovation impact.
- New business opportunities.
- Enhanced regional economic development.

8. Establishing Monitoring and Evaluation Mechanisms

Long-term success requires systematic monitoring of progress and impacts.

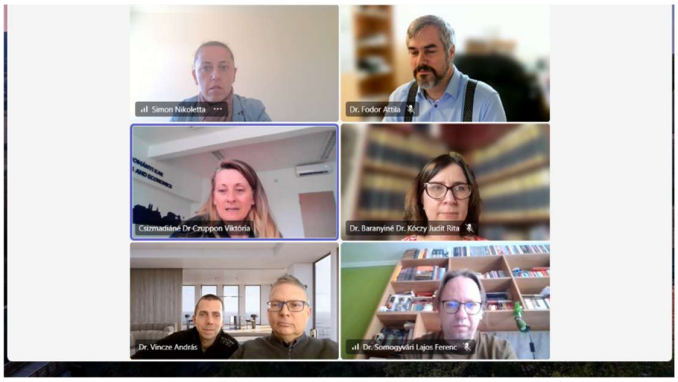
Possible actions:

- Define key performance indicators (KPIs) for bioeconomy development.
- Conduct regular stakeholder surveys.
- Implement annual progress reviews.
- Use AHP and other decision-support tools for prioritization.

Expected outcomes:

- Evidence-based decision making.
- Improved resource allocation.
- Continuous institutional learning and improvement.

h. Documentation



AUT Expert Workshop Report

Workshop Details:

Date & Time : 16 July 2026
Location : Online/Agricultural University of Tirana (AUT)
Number of Participants : 16

Stakeholder Representation	Representative Roles	Number of Participants
Academia	Professors, researchers and academic staff from AUT representing relevant fields related to bioeconomy, agriculture, environment, biotechnology and innovation	10
Industry	Private sector representatives from businesses related to Bio-Based products, waste valorisation, circular economy and innovation	4
Government	Representatives from the **Agency of Waste Management Economy (AKEM)**	2
Civil Society	-	-

Summary of Discussions:

Workshop Objectives Achieved:

- The workshop confirmed AUT's strategic potential to become a national knowledge hub for bioeconomy by strengthening interdisciplinary research, expanding partnerships with industry and public authorities, and improving technology transfer mechanisms.
- Identified key stakeholders and strategic partnerships needed to strengthen AUT's role within the bioeconomy ecosystem.
- Conducted a SWOT analysis to identify institutional strengths, weaknesses, opportunities and threats related to bioeconomy development.
- Discussed strategic directions through the TOWS framework, focusing on how AUT can transform existing capacities into concrete actions.
- Defined priority areas for future SMART objectives and actions, including interdisciplinary research, laboratory capacities, innovation partnerships and knowledge transfer.

Key Highlights:

- Strong agreement among participants on the importance of strengthening interdisciplinary cooperation between AUT faculties and research fields.

- Participants highlighted AUT's potential role as a Knowledge Hub and Innovation Catalyst in bioeconomy through research, expertise and partnerships.
- The need to improve collaboration between academia and industry was emphasized, particularly for valorisation of agricultural residues, waste streams and development of Bio-Based products.
- Government representatives from the Agency of Waste Management Economy (AKEM) highlighted the importance of alignment with national waste management objectives, recycling targets and circular economy principles.
- Participants identified the need for stronger research structures, improved laboratory capacities, accredited analytical services and better coordination of existing expertise within AUT.
- The discussion highlighted opportunities through EU-funded programmes, international partnerships and cooperation with advanced research institutions.

a. Stakeholder Ecosystem Mapping

Stakeholder Group	Examples	Connection to HEI Role	Current Interaction	Desired Future Interaction
Industry & Business	Alb Shpk (olive processing by-products); Green Recycling; RecycAl – Circular Economy Park (glass recycling, waste valorisation, circular economy solutions); companies working with biomass and agricultural residues.	Applied research, technology transfer, testing and validation of bioeconomy solutions, innovation projects, industry-driven challenges for research	Cooperation mainly through individual projects, expert networks and practical initiatives; examples of collaboration in waste valorisation and circular economy	Develop structured partnerships, joint research and innovation projects, pilot demonstrations, technology transfer and creation of new Bio-Based products and services
Government & Policy	Agency of Waste Management Economy (AKEM); relevant public institutions	Scientific expertise, evidence-based policy support, contribution to circular economy and waste management strategies	Interaction through consultations and participation in relevant discussions/projects	Stronger role of AUT as scientific partner supporting legislation, national strategies and implementation of EU environmental priorities
Academia & Research	AUT faculties, laboratories, international universities and research centres	Knowledge generation, interdisciplinary research, innovation and education	Existing research capacity and publications, but cooperation between disciplines and departments remains fragmented	Establish interdisciplinary research structures, stronger collaboration between faculties, shared laboratories,

				international projects and knowledge hubs
Civil Society & NGOs	No civil society organisations participated in the workshop	Potential role in awareness raising, community engagement, dissemination of bioeconomy knowledge and local impact activities	No direct interaction discussed during this workshop	Strengthen future collaboration with NGOs and community organisations through awareness activities, citizen engagement, sustainability initiatives and local bioeconomy projects.
Students & Workforce	AUT students, graduates, young researchers and professionals	Skills development, future workforce preparation, entrepreneurship and practical learning	Academic programmes exist, but stronger connection with industry and practical applications is needed	Develop internships, practical training, entrepreneurship opportunities, student projects with companies and circular economy actors

b. HEI Role Definition

Role Category	Current Role (What the HEI does now)	Aspirational Role (What the HEI should do in the future)
Knowledge Hub	Research, publications and expertise exist, but activities are partly fragmented.	Develop an interdisciplinary bioeconomy knowledge hub connecting research, industry and policy.
Innovation Catalyst	Participates in projects and provides expertise to innovation initiatives.	Support pilot projects, technology transfer, start-ups and industry collaboration.
Policy Advisor	Provides scientific input in agriculture, environment and sustainability topics.	Strengthen evidence-based support for bioeconomy and circular economy policies.
Capacity Builder	Provides education and develops student skills through existing programmes.	Develop specialised bioeconomy education, practical training and industry links.
Network Connector	Cooperates with partners through projects and initiatives.	Build stronger long-term partnerships between academia, industry, government and society.
Sustainability Champion	Promotes sustainability through research and education.	Lead practical solutions and awareness for sustainable bioeconomy development.

c. SWOT Findings

	HELPFUL	HARMFUL
INTERNAL	**STRENGTHS**	**WEAKNESSES**
	• Strong academic expertise and established research capacity in agriculture, environmental sciences, biotechnology, and related disciplines. • Proven experience in implementing EU-funded projects and fostering international research collaborations. • Existing laboratory infrastructure and technical expertise that provide a solid foundation for applied bioeconomy research and innovation. • Highly qualified academic staff and multidisciplinary study programmes that support education, research, and capacity building in the bioeconomy.	• Research activities remain fragmented across faculties and departments, limiting interdisciplinary collaboration and knowledge integration. • Absence of a dedicated bioeconomy research centre or living laboratory to coordinate research, innovation, and stakeholder engagement. • Limited institutional mechanisms to promote cross-faculty collaboration and joint research initiatives. • Insufficient structured cooperation with industry and underdeveloped technology transfer and innovation support mechanisms
EXTERNAL	**OPPORTUNITIES**	**THREATS**
	• Increasing policy and financial support for bioeconomy, circular economy, and Green Deal initiatives at the European level. • Expanded funding opportunities through Horizon Europe, Interreg, and other international research and innovation programmes. • Growing potential for strategic partnerships with industry to promote biomass valorisation, waste management, and the development of bio-based products. • Rising demand for sustainable technologies, innovative bio-based solutions, and research-driven start-ups, creating new opportunities for knowledge transfer and commercialization.	• • Limited and unpredictable national and international funding may constrain long-term research and innovation activities. • Rapid technological and policy developments in the bioeconomy sector may outpace the University's capacity to adapt and respond effectively. • Regulatory challenges concerning the classification and utilisation of waste as secondary raw materials may hinder innovation and commercialisation. • Fragmented collaboration among stakeholders and limited market uptake of research outcomes may reduce the impact of innovation and technology transfer efforts.

d. Strategic Direction – TOWS Matrix

OPPORTUNITIES	STRENGTHS	WEAKNESSES
	S-O Strategies	**W-O Strategies**
	• Use AUT expertise and research capacity to participate in EU bioeconomy and circular economy projects. • Use existing laboratories and academic expertise to support industry innovation. • Build on international project experience to create new partnerships. • Transfer research results into practical solutions and products. • Support start-ups and innovation initiatives based on research.	• Develop an interdisciplinary bioeconomy research structure connecting different faculties. • Establish stronger cooperation mechanisms with companies and external partners. • Create a bioeconomy hub/living lab for research, demonstration and innovation. • Strengthen laboratory capacities and analytical services for Bio-Based products. • Improve integration of bioeconomy topics into curricula and training.
THREATS	**S-T Strategies**	**W-T Strategies**
	• Use scientific expertise to support policy development and regulatory improvements. • Strengthen collaboration with industry to respond to market needs. • Use international networks to address knowledge and technology gaps. • Provide evidence-based solutions for waste and biomass valorisation challenges • Promote AUT as a reliable partner for sustainable innovation.	• Reduce fragmentation of research through structured interdisciplinary cooperation. • Develop long-term funding strategies for bioeconomy research. • Improve internal coordination between departments and researchers. • Strengthen technology transfer and market connection mechanisms. • Increase capacity for product validation and testing services.

e. SMART Goals and Actions

Strategic Directions	SMART Goal Title	Proposed Action	Expected Impact	Responsible Unit
Strengthen Bioeconomy Research Capacity	Develop interdisciplinary bioeconomy research capacities at AUT	Strengthen collaboration between faculties, researchers and laboratories; promote interdisciplinary projects linking agriculture, environment, forestry, economy and other fields.	More integrated research, stronger innovation capacity and improved solutions for bioeconomy challenges.	AUT Faculties, Research Units
Develop Laboratory & Testing Capacities	Expand laboratory capacities for Bio-Based products and waste valorisation	Upgrade analytical laboratory capacity through acquisition of new equipment, staff training, and accreditation of at least two analytical methods by 2028.	Better support for research, companies and market-oriented innovation.	AUT Laboratories, Relevant Faculties
Strengthen Industry Collaboration & Technology Transfer	Increase cooperation between AUT and private sector actors	Develop partnerships with companies, support pilot projects, technology transfer and practical applications of research results (e.g. circular economy and recycling solutions).	Stronger connection between research and market needs; increased innovation uptake.	AUT Management, Project Office, Faculties
Position AUT as Bioeconomy Knowledge Hub	Establish AUT as a recognised actor in bioeconomy development	Increase AUT participation in Horizon Europe and Interreg proposals by submitting at least five collaborative proposals by 2028 and establishing three new international research partnerships.	Higher visibility, stronger partnerships and greater contribution to national bioeconomy development.	AUT Management, Research Units, International Relations Office

Each smart action will be measurable using the following indicators:

Goal	Suggested KPI
Research capacity	Number of interdisciplinary projects
Industry collaboration	Number of signed cooperation agreements
Knowledge hub	Number of policy briefs produced
Laboratory capacity	Number of accredited methods
Education	Number of new bioeconomy courses
Technology transfer	Number of pilot demonstrations
Internationalisation	Number of Horizon Europe proposals

f. Participant Feedback

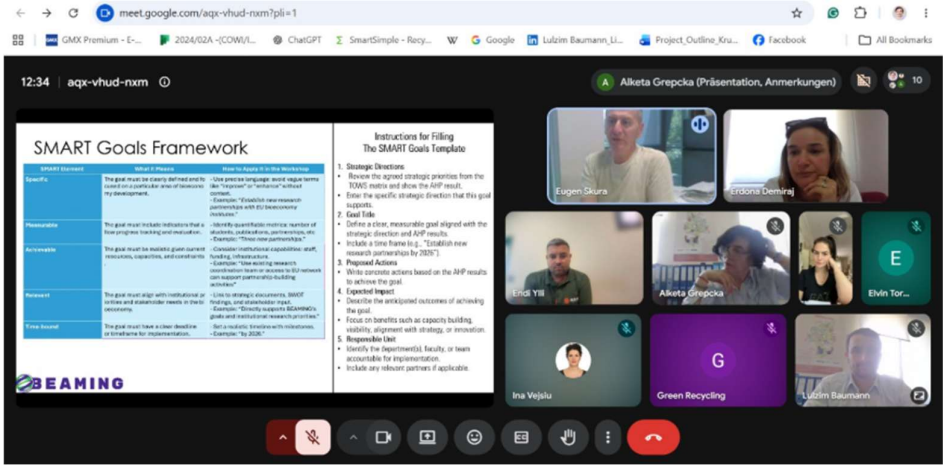
What worked well:

- Participants reported that the workshop successfully facilitated dialogue among academia, government and industry, leading to as shared understanding of AUT's future role within the national bioeconomy ecosystem.
- Good exchange of ideas on AUT's role in bioeconomy, research priorities and future partnerships.
- Identification of key strengths, challenges and strategic directions for AUT.

Areas for improvement:

- Need for stronger interdisciplinary collaboration between different AUT faculties and research fields.
- Need for more structured engagement with industry and external stakeholders.
- Future workshops could include more representatives from private sector and civil society to broaden perspectives.

g. Documentation



Annex III - AHP Results Analysis

The collected pairwise comparison judgements from the AHP survey data were analysed using standard AHP procedures. The analysis was conducted separately for each partner institution to derive institution-specific priority rankings for the criteria and proposed action plans.

AUP AHP Results

AUP submitted a total of 2 responses to the AHP survey. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the CR with an acceptable threshold of 0,1 and a borderline acceptable range of less than 0,2. The results showed that the criteria comparison matrix achieved a CR of 0,105, which slightly exceeded the conventional threshold of 0,10; the value remains within the commonly accepted borderline consistency range.

This result can still be considered acceptable for interpretation because:

- the deviation from the standard threshold is minimal,
- the number of respondents was limited,
- and the judgments still demonstrate a reasonably coherent prioritisation pattern.

Therefore, the criteria judgments are considered sufficiently reliable for institutional strategic interpretation, while acknowledging a moderate level of variation in respondent perspectives.

All alternative comparison matrices on the other hand, had acceptable CR values. The acceptable consistency of all alternative matrices further strengthens the reliability of the prioritised action plans.

AUP CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,105	Borderline
Alternatives under C1	0,077	Acceptable
Alternatives under C2	0,06	Acceptable
Alternatives under C3	0,06	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0	Acceptable
Alternatives under C6	0,06	Acceptable
Alternatives under C7	0,06	Acceptable

The AHP analysis produced the following criteria weights for AUP:

Criterion	Priority Weight	Rank
Sustainable biomass use and circularity integration (**C2**)	22,1%	1
Environmental and climate contribution (**C3**)	17,7%	2
Skills development (**C6**)	15,3%	3
Innovation and investment scale-up (**C1**)	12,5%	4
Economic impact and competitiveness (**C4**)	11,3%	5
Interdisciplinary collaboration (**C5**)	10,8%	6
Researcher career support (**C7**)	10,4%	7

The criteria priorities indicate that AUP places the highest strategic importance on sustainability-oriented bioeconomy development with Sustainable biomass use and circularity integration (C2) and Environmental and climate contribution (C3) as the first and second highest ranked actions.

This suggests that the institution views:

- sustainable biomass valorisation,
- circular resource use
- environmental monitoring,
- and climate-conscious research practices

as the most important strategic priorities for advancing bioeconomy research.
The third- and fourth-ranked criteria, Skills development (C6) and Innovation and investment scale-up (C1), also received considerable importance, indicating that human capital strengthening and innovation development and institutional scaling are important priorities.
In contrast, Interdisciplinary collaboration (C5) and Researcher career support (C7) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities for bioeconomy research development.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for AUP were:

Action Plans	Global Priority	Rank
Partner with local industries or municipalities to co-develop circular bio-based pilot solution (**A6**)	11,36%	1
Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (**A10**)	9,11%	2

Develop interdisciplinary educational programs/bioeconomy teaching modules (**A16**)	7,85%	3
Integrate circular design principles into project planning and procurement (**A7**)	6,74%	4
Develop an internal system for technology transfer and commercialisation of innovations (**A11**)/ Establish entrepreneurial support programs (**A12**)	5,63%	5

The highest-ranked action for AUP was **A6** – Partner with industries/municipalities for circular bio-based pilot solutions, which strongly reflects the importance of the highest criterion, Sustainable biomass use and circularity integration (C2). **A7** - Integrate circular design principles into project planning and procurement as the fourth-ranked action, further highlighting the importance of C2. The highest ranking of A6 indicates that AUP strongly prioritises practical collaboration and implementation-oriented circular bioeconomy initiatives.

The actions demonstrate the institution's intention to:

- strengthen external stakeholder cooperation,
- integrate circular principles,
- and translate sustainability principles into operational practice.

The second-ranked action, **A10** – Introduce green lab standards including energy efficiency, sustainable materials and waste reduction practices, strongly reflects the importance of the criterion Environmental and climate contribution (C3) as the second-ranked criterion. The strong ranking of A10 demonstrates that AUP places

significant emphasis on environmentally responsible institutional operations and sustainable laboratory practices.

The third-ranked criterion, Skills development (C6), is strongly reflected in **A16** – Develop interdisciplinary educational programs/bioeconomy teaching modules (Rank 3). This result demonstrates that AUP prioritises strengthening institutional educational capacity and bioeconomy-related competencies. The high ranking of A16 suggests that the institution recognises interdisciplinary education as a critical mechanism for bioeconomy capacity development.

Although Economic impact and competitiveness (C4) ranked fifth overall, the actions:

A11 – Develop technology transfer and commercialisation systems (Rank 5; 5,63%)

A12 – Establish entrepreneurial support programs (Rank 5; 5,63%)

achieved strong global priorities due to high local priorities within the criterion. It should also be noted that A11 and A12 received identical global priority values and shared the same ranking position. This result occurred because both respondents provided equal pairwise judgments between the two alternatives within C4, resulting in identical local and global priority scores after aggregation.

This indicates a strong respondent agreement regarding the importance of commercialisation and entrepreneurial support mechanisms for strengthening institutional innovation impact.

BME AHP Results

BME submitted a total of 9 responses to the AHP survey. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the Consistency Ratio with an acceptable threshold of 0,1. The results showed that the criteria and the alternative comparison judgments had acceptable CR values. Therefore, the consistency of the judgments was considered sufficient and reliable for institutional prioritisation purposes.

BME CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,0095	Acceptable
Alternatives under C1	0,0682	Acceptable
Alternatives under C2	5E-05	Acceptable
Alternatives under C3	0,0257	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0,0087	Acceptable
Alternatives under C6	8E-08	Acceptable
Alternatives under C7	0,0019	Acceptable

The AHP analysis produced the following criteria weights for BME:

Criterion	Priority Weight	Rank
Environmental and climate contribution (**C3**)	17,0%	1
Sustainable biomass use and circularity integration (**C2**)	16,9%	2
Innovation and investment scale-up (**C1**)	15,4%	3
Researcher career support (**C7**)	13,7%	4

Skills development (**C6**)	13,1%	5
Interdisciplinary collaboration (**C5**)	13,0%	6
Economic impact and competitiveness (**C4**)	10,9%	7

The criteria priorities indicate that BME places the highest strategic importance on sustainability-oriented bioeconomy development, particularly environmental performance and circular resource management, with Environmental and climate contribution (C3) and Sustainable biomass use and circularity integration (C2) receiving the highest two weights.

This suggests that the institution views:

- environmental monitoring,
- climate-conscious research practices
- and practical circular bioeconomy applications

as the most important strategic priorities for advancing bioeconomy research.

The third- and fourth-ranked criteria, Innovation and investment scale-up (C1) and Researcher career support (C7), also received considerable importance, indicating that innovation development and institutional scaling, as well as career support for researchers, are important priorities.

In contrast, Interdisciplinary collaboration (C5) and Economic impact and competitiveness (C4) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities for bioeconomy research development.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for BME were:

Action Plans	Global Priority	Rank
Partner with local industries or municipalities to co-develop circular bio-based pilot solution (**A6**)	7,91%	1
Establish career development programs (**A19**)	7,48%	2
Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance (**A8**)	7,21%	3
Develop an internal system for technology transfer and commercialisation of innovations (**A11**)	6,68%	4
Develop pilot and demonstration infrastructures (**A1**)	6,12%	5

The highest-ranked action for BME was **A6** – Partner with industries/municipalities for circular bio-based pilot solutions, which strongly reflects the importance of the second-highest criterion, Sustainable biomass use and circularity integration (C2). The highest ranking of A6 indicates that BME strongly prioritises practical collaboration and implementation-oriented circular bioeconomy initiatives.

This demonstrates the institution's intention to:

- strengthen external stakeholder cooperation,
- implement applied circular pilot solutions,
- and translate sustainability principles into operational practice.

Although Researcher career support (C7) was ranked fourth among the criteria, one action under this criterion achieved exceptionally high priority: **A19** – Establish career development programmes (Rank 2). This occurred because A19 received a very high local priority within C7 (54.6%), indicating strong respondent agreement regarding its importance relative to other researcher-support actions. The prioritisation of A19 indicates that BME recognises the importance of strengthening:

- researcher retention,
- professional development,
- institutional human capacity,
- and long-term research sustainability.

This finding also demonstrates that highly preferred actions under moderately weighted criteria can achieve very high global priorities in AHP analysis.

The highest-ranked criterion, Environmental and climate contribution (C3), is reflected in the prioritisation of **A8** – Integrate LCA, carbon footprinting, and soil health monitoring into research projects (Rank 3). These actions demonstrate that BME prioritises:

- environmental sustainability assessment,
- climate-oriented research practices,
- and environmentally responsible institutional operations.

Although Economic impact and competitiveness (C4) was the lowest-ranked criterion overall, the action **A11** – Develop technology transfer and commercialisation systems (Rank 4) achieved a high global priority because it received a strong local priority within C4 (61.1%). This indicates that respondents strongly agreed that technology transfer systems are the most important action within the economic competitiveness dimension. The result suggests that BME recognises commercialisation and innovation transfer as important enabling

mechanisms for strengthening institutional research impact and practical application of bioeconomy innovations.

A1 – Develop pilot and demonstration infrastructures (Rank 5) reflected the third-ranked criterion, Innovation and investment scale-up (C1). The high ranking of A1 indicates that BME places significant importance on strengthening institutional innovation infrastructure and demonstration capacity.

This suggests that the institution seeks to improve:

- innovation implementation capability,
- applied research infrastructure,
- and institutional scaling of bioeconomy initiatives.

EDU AHP Result

EDU submitted 16 responses to the AHP survey. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the Consistency Ratio. The aggregated comparison matrices of criteria and alternatives for EDU met the acceptable consistency threshold of 0,1. This indicates that the institutional judgments were sufficiently consistent for reliable prioritisation.

EDU CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,014	Acceptable
Alternatives under C1	0,021	Acceptable
Alternatives under C2	0,015	Acceptable
Alternatives under C3	0,002	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0,0004	Acceptable
Alternatives under C6	0,012	Acceptable
Alternatives under C7	0,006	Acceptable

The AHP analysis produced the following criteria weights for EDU:

Criterion	Priority Weight	Rank
Sustainable biomass use and circularity integration (**C2**)	18,3%	1
Environmental and climate contribution (**C3**)	18,0%	2
Innovation and investment scale-up (**C1**)	15,4%	3
Interdisciplinary collaboration (**C5**)	13,8%	4
Economic impact and competitiveness (**C4**)	13,4%	5
Skills development (**C6**)	11,1%	6

Researcher career support (**C7**)	10,0%	7

The results show that Sustainable biomass use and circularity integration (C2) was identified as the most important criterion for EDU, followed closely by Environmental and climate contribution (C3). This indicates that EDU prioritises:

- improving resource circularity,
- sustainable biomass use,
- environmental sustainability,
- and climate-oriented research outcomes.

The relatively high weight of Innovation and Investment Scale-up (C1) also shows that the university recognises the importance of strengthening research infrastructure and innovation investments.

In contrast, Researcher career support (C7) and Skills development (C6) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities compared to institutional sustainability and innovation interventions.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for EDU were:

Action Plans	Global Priority	Rank
Develop an internal system for technology transfer and commercialisation of innovations (**A11**)	7,14%	1
Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (**A10**)	6,44%	2
Develop a pilot system for nutrient recycling and residue valorisation (**A5**)	6,37%	3

Establish entrepreneurial support programs (**A12**)	6,25%	4
Establish institutional monitoring of biodiversity or ecosystem services linked to research activities (**A9**)	6,12%	5

The highest-ranked action for EDU was **A11** – Develop an internal system for technology transfer and commercialisation of innovations, which reflects the fifth-ranked criterion, Economic impact and competitiveness (C4). Although C4 did not receive the highest priority, action A11 achieved a high global priority because it received a strong local priority within C4 (53,3%).

This indicates that respondents strongly agreed that technology transfer systems are the most important action within the economic competitiveness dimension. The result suggests that EDU recognises commercialisation and innovation transfer as the most important enabling mechanisms for strengthening institutional research impact and practical application of bioeconomy innovations. The prioritisation of **A12** as the fourth rank – Establish entrepreneurial support programs further shows that the university aims to support innovation commercialisation and entrepreneurship as key components of its bioeconomy strategy.

The second-ranked action, **A10** – Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices) strongly aligns with the importance of the second-ranked criterion, Environmental and climate contribution (C3). This highlights the importance of improving environmental sustainability within research operations and infrastructure.

Similarly, the fifth rank of **A9** – Establish institutional monitoring of biodiversity or ecosystem services linked to research activities further

reflects the importance placed on monitoring the environmental outcomes of research initiatives.

The third-ranked action, **A5** – Develop a pilot system for nutrient recycling and residue valorisation, strongly reflects the highest priority of the criterion, Sustainable biomass use and circularity integration (C2). This action demonstrates the university's commitment to circular bioeconomy implementation through improved resource recovery and nutrient reuse systems.

UKIM AHP Results

UKIM submitted a total of 13 responses to the AHP survey. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the Consistency Ratio with an acceptable threshold of 0,1. The results showed that the criteria and the alternative comparison judgments had acceptable CR values. Therefore, the consistency of the judgments was considered sufficient and reliable for institutional prioritisation purposes.

UKIM CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,0103	Acceptable
Alternatives under C1	0,029	Acceptable
Alternatives under C2	0,007	Acceptable
Alternatives under C3	0,001	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0,002	Acceptable
Alternatives under C6	0,002	Acceptable
Alternatives under C7	0,02	Acceptable

The AHP analysis produced the following criteria weights for UKIM:

Criterion	Priority Weight	Rank
Environmental and climate contribution (**C3**)	22,3%	1
Sustainable biomass use and circularity integration (**C2**)	19,4%	2
Innovation and investment scale-up (**C1**)	14,6%	3
Researcher career support (**C7**)	12,4%	4

Skills development (**C6**)	11,0%	5
Economic impact and competitiveness (**C4**)	10,4%	6
Interdisciplinary collaboration (**C5**)	9,8%	7

The criteria priorities indicate that UKIM places the highest strategic importance on sustainability-oriented bioeconomy development, particularly environmental performance and circular resource management, with Environmental and climate contribution (C3) and Sustainable biomass use and circularity integration (C2) receiving the highest two weights.

This suggests that the institution views:

- environmental monitoring,
- climate-conscious research practices
- and practical circular bioeconomy applications

as the most important strategic priorities for advancing bioeconomy research.

The third- and fourth-ranked criteria, Innovation and investment scale-up (C1) and Researcher career support (C7), also received considerable importance, indicating that innovation development and institutional scaling, as well as career support for researchers, are important priorities.

In contrast, Economic impact and competitiveness (C4) and Interdisciplinary collaboration (C5) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities for bioeconomy research development.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for UKIM were:

Action Plans	Global Priority	Rank
Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance (**A8**)	9,92%	1
Partner with local industries or municipalities to co-develop circular bio-based pilot solution (**A6**)	7,95%	2
Develop a pilot system for nutrient recycling and residue valorisation (**A5**)	7,35%	3
Provide internal seed funding or mobility grants for early-career led pilot research and international networking (**A21**)	6,57%	4
Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (**A10**)	6,33%	5

The highest-ranked action for UKIM was **A8 –** Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance, which strongly reflects the importance of the highest criterion, Environmental and climate contribution (C3). The fifth-ranked action, **A10** – Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices, also reflects the importance of C3. These actions demonstrate that UKIM prioritises:

- sustainability assessment integration,
- climate-conscious research practices,
- environmental monitoring,
- and environmentally responsible operational systems.

The second-highest criterion, Sustainable biomass use and circularity integration (C2) is reflected through the second and the third-ranked actions, **A6** – Partner with industries/municipalities for circular bio-based pilot solutions and **A5** – Develop a pilot system for nutrient recycling and residue valorisation.

These actions indicate that UKIM strongly prioritises:

- practical circular bioeconomy implementation,
- resource efficiency,
- circular pilot projects,
- and collaboration with external stakeholders.

The strong ranking of A6 and A5 demonstrates the institution's intention to strengthen applied circularity solutions and sustainable biomass valorisation systems.

Although Researcher career support (C7) was ranked fourth among the criteria, one action under this criterion achieved high priority: **A21** – Provide internal seed funding or mobility grants for early-career led pilot research and international networking (Rank 4). This occurred because A21 received a very high local priority within C7 (52,8%), indicating strong respondent agreement regarding its importance relative to other researcher-support actions. The result suggests that UKIM considers support for early-career researchers and international networking as critical enabling mechanisms for strengthening institutional research capacity and international engagement.

This finding also demonstrates that highly preferred actions under moderately weighted criteria can achieve very high global priorities in AHP analysis.

UNIBL AHP Results

A total of 15 responses to the AHP survey were submitted by UNIBL. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the Consistency Ratio. The aggregated comparison matrices of criteria and alternatives for UNIBL met the acceptable consistency threshold of 0,1. This indicates that the institutional judgments were sufficiently consistent for reliable prioritisation.

UNIBL CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,01038	Acceptable
Alternatives under C1	0,0097	Acceptable
Alternatives under C2	0,09	Acceptable
Alternatives under C3	0,03	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0,008	Acceptable
Alternatives under C6	0,003	Acceptable
Alternatives under C7	0,0007	Acceptable

The AHP analysis produced the following criteria weights for UNIBL:

Criterion	Priority Weight	Rank
Innovation and investment scale-up (**C1**)	21,1%	1
Environmental and climate contribution (**C3**)	14,7%	2
Economic impact and competitiveness (**C4**)	14,5%	3
Skills development (**C6**)	13,2%	4
Interdisciplinary collaboration (**C5**)	12,9%	5
Researcher career support (**C7**)	11,9%	6

Sustainable biomass use and circularity integration (**C2**)	11,6%	7

The results show that Innovation and investment scale-up (C1) was identified as the most important criterion for UNIBL. This suggests a strong institutional focus on:

- strengthening research infrastructure,
- scaling innovation activities,
- and increasing investment in bioeconomy-related research.

The second and third priorities, Environmental and climate contribution (C3) and Economic impact and competitiveness (C4), indicate that UNIBL aims to balance:

- environmental sustainability,
- and climate-oriented research outcomes,
- and economic relevance of research.

Skills development (C6) as the fourth rank, followed by Interdisciplinary collaboration (C5) as the fifth rank, also show that the university recognises the importance of developing competencies and strengthening collaboration across disciplines and sectors.

In contrast, Researcher career support (C7) and Sustainable biomass use and circularity integration (C2) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities for bioeconomy research development.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for UNIBL were:

Action Plans	Global Priority	Rank
Establish entrepreneurial support programs (**A12**)	7,61%	1
Launch of joint pilot projects with regional agri-food and bio-based industries (**A3**)	7,55%	2
Develop an internal system for technology transfer and commercialisation of innovations (**A11**)	6,92%	3
Establish collaboration/matchmaking events between industry and academia in the field of bioeconomy (**A14**)	5,91%	4
Establish institutional monitoring of biodiversity or ecosystem services linked to research activities (**A9**)	5,89%	5

The highest-ranked action for UNIBL was **A12** – Establish entrepreneurial support programs, which reflects the importance of the third-ranked criterion, Economic impact and competitiveness (C4), further supported by the third-ranked action, **A11** – Develop an internal system for technology transfer and commercialisation of innovations under the same criterion. These actions indicate that UNIBL strongly emphasises:

- fostering entrepreneurship,
- developing technology transfer system,
- supporting innovation commercialisation,
- and translating research into economic value.

This indicates that the university considers the establishment of an entrepreneurial program and an effective technology transfer and innovation commercialisation system as the most strategic priority for strengthening bioeconomy research.

The second-ranked action, **A3** – Launch of joint pilot projects with regional agri-food and bio-based industries, strongly reflects the importance of the highest rank criterion, Innovation and investment scale-up (C1). This action highlights the importance of:

- industry collaboration,
- applied research,
- and real-world pilot implementation.

This confirms that UNIBL prioritises practical innovation and industry engagement.

Although the criterion Interdisciplinary collaboration (C5) was ranked fifth among the criteria, one action under this criterion achieved high priority: **A14** – Establish collaboration/matchmaking events between industry and academia in the field of bioeconomy (rank 4). This occurred because A14 received a very high local priority within C5, indicating strong respondent agreement regarding its importance relative to other interdisciplinary collaboration actions. The result suggests that UNIBL considers collaboration between industry and academia as a key enabler of innovation in bioeconomy research.

The fifth rank of **A9** – Establish institutional monitoring of biodiversity or ecosystem services linked to research activities strongly reflects the importance of the second-ranked criterion, Environmental and climate contribution (C3). This reflects the institution's commitment to:

- environmental monitoring,
- sustainability assessment,
- and ecosystem protection.

It shows that environmental responsibility is integrated into the research agenda.

UNIOS AHP Results

UNIOS submitted a total of 10 responses to the AHP survey. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the Consistency Ratio with an acceptable threshold of 0,1. The results showed that the criteria and the alternative comparison matrices had acceptable CR values. Therefore, the consistency of the judgments was considered adequate for institutional prioritisation.

UNIOS CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,0066	Acceptable
Alternatives under C1	0,0011	Acceptable
Alternatives under C2	0,007	Acceptable
Alternatives under C3	0,004	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0	Acceptable
Alternatives under C6	0,023	Acceptable
Alternatives under C7	0,034	Acceptable

The AHP analysis produced the following criteria weights for UNIOS:

Criterion	Priority Weight	Rank
Researcher career support (**C7**)	19,1%	1
Skills development (**C6**)	19,0%	2
Sustainable biomass use and circularity integration (**C2**)	16,1%	3
Environmental and climate contribution (**C3**)	13,8%	4
Interdisciplinary collaboration (**C5**)	12,3%	5

Innovation and investment scale-up (**C1**)	11,3%	6
Economic impact and competitiveness (**C4**)	8,5%	7

The criteria priorities indicate that UNIOS places the highest strategic importance on researcher support and capacity building, with Researcher career support (C7) and Skills development (C6) receiving the highest two weights.

This suggests that the institution views:

- strengthening researcher career pathways,
- improving project development capacity,
- and enhancing human resource skills

as the most important strategic priorities for advancing bioeconomy research.

The third-ranked criterion, Sustainable biomass use and circularity integration (C2), also received considerable importance, indicating that sustainability and circularity are significant but secondary to human capacity development.

In contrast, Innovation and investment scale-up (C1) and Economic impact and competitiveness (C4) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities for bioeconomy research development.

Overall, the criteria priorities indicate that UNIOS adopts a capacity-building oriented strategy, focusing primarily on empowering researchers and improving institutional skills as the foundation for future bioeconomy research development.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for UNIOS were:

Action Plans	Global Priority	Rank
Provide internal seed funding or mobility grants for early-career led pilot research and international networking (**A21**)	8,48%	1
Launch and test pilot bioeconomy courses (**A18**)	6,80%	2
Integrate bioeconomy challenges into doctoral and MSc programmes (**A17**)	6,40%	3
Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (**A10**)	6,11%	4
Provide training for writing and implementing projects (**A20**)	5,95%	5

The highest-priority action for UNIOS was **A21** – Provide internal seed funding or mobility grants for early-career led pilot research and international networking. This action strongly aligns with the highest criterion priority, Researcher career support (C7).

This indicates that the institution considers financial and mobility support for early-career researchers as the most strategic intervention for strengthening bioeconomy research capacity.

This reflects the importance of:

- enabling early-stage research initiatives,
- supporting researcher mobility,
- and facilitating international collaboration opportunities.

The fifth-ranked action, **A20** - Provide training for writing and implementing projects, emphasises the importance of strengthening researchers' ability to prepare and manage research projects. Action A20 under the same criterion of C7 further confirms the institution's emphasis on strengthening internal research competencies.

The second- and third-ranked actions, **A18** - Launch and test pilot bioeconomy courses and **A17** - Integrate bioeconomy challenges into doctoral and MSc programmes, are both linked to skills development (C6), further reinforcing the institution's emphasis on capacity building through education and training.

The fourth-ranked action, **A10** - Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices, highlights the importance of improving environmental sustainability in research operations.

UNSFA AHP Results

UNSFA submitted a total of 14 responses to the AHP survey. However, one respondent only completed the pairwise comparison judgments for the criteria and did not provide judgments for the alternatives. Therefore:

- 14 responses were included in the aggregation of the criteria comparisons,
- while 13 complete responses were used for the aggregation of the alternative comparisons.

The consistency of the aggregated criteria and the alternative comparison matrices met the acceptable consistency threshold of 0,1. Therefore, the consistency of the judgments was considered sufficient and reliable for institutional prioritisation purposes.

UNSFA CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,0165	Acceptable
Alternatives under C1	0,0291	Acceptable
Alternatives under C2	0,0023	Acceptable
Alternatives under C3	0,0068	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0,0015	Acceptable
Alternatives under C6	0,0018	Acceptable
Alternatives under C7	0,0399	Acceptable

The AHP analysis produced the following criteria weights for UNSFA:

Criterion	Priority Weight	Rank
Environmental and climate contribution (**C3**)	21,8%	1
Sustainable biomass use and circularity integration (**C2**)	18,2%	2
Innovation and investment scale-up (**C1**)	12,8%	3

Researcher career support (**C7**)	12,7%	4
Interdisciplinary collaboration (**C5**)	12,3%	5
Skills development (**C6**)	12,0%	6
Economic impact and competitiveness (**C4**)	10,1%	7

The criteria priorities indicate that UNSFA places the highest strategic importance on sustainability-oriented bioeconomy development, particularly environmental performance and circular resource management, with Environmental and climate contribution (C3) and Sustainable biomass use and circularity integration (C2) receiving the highest two weights.

This suggests that the institution views:

- environmental monitoring,
- climate-conscious research practices
- and practical circular bioeconomy applications

as the most important strategic priorities for advancing bioeconomy research.

The third- and fourth-ranked criteria, Innovation and investment scale-up (C1) and Researcher career support (C7), also received considerable importance, indicating that innovation development and institutional scaling, as well as career support for researchers, are important priorities.

In contrast, Skills development (C6) and Economic impact and competitiveness (C4) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities for bioeconomy research development.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for UNSFA were:

Action Plans	Global Priority	Rank
Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance (**A8**)	9,09%	1
Partner with local industries or municipalities to co-develop circular bio-based pilot solution (**A6**)	7,95%	2
Establish institutional monitoring of biodiversity or ecosystem services linked to research activities (**A9**)	6,72%	3
Develop an internal system for technology transfer and commercialisation of innovations (**A11**)	6,45%	4
Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (**A10**)	6,02%	5

The prioritised action plans reflect the broader strategic priorities identified at the criteria level. The results indicate that UNSFA's action plan priorities are strongly aligned with its highest-ranked criteria.

The action plans under the criterion Environmental and climate contribution (C3):

- A8 – Integrate LCA, carbon footprinting, and soil health monitoring into research projects (Rank 1)

- A9 – Establish institutional monitoring of biodiversity or ecosystem services (Rank 3)
- A10 – Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (Rank 5)

Strongly align with the highest weight assigned to C3 and confirm the institution's emphasis on environmentally responsible research operations. The prioritisation of A8 as the highest-ranked action overall indicates that the institution places particular importance on integrating measurable environmental indicators into research activities. Similarly, A9 and A10 reinforce the institution's commitment to operational sustainability and environmental responsibility.

A6 – Partner with industries/municipalities for circular bio-based pilot solutions (Rank 2), aligns with the second-highest criterion - Sustainable biomass use and circularity integration (C2). This indicates that UNSFA seeks to operationalise circular bioeconomy principles through collaborative pilot initiatives.

A11 – Develop technology transfer and commercialisation systems received the fourth rank, even though the criterion of Economic impact and competitiveness (C4) has the lowest rank. This occurred because A11 received a very strong local priority within C4 (63.8%). The prioritisation of A11 therefore highlights the institution's recognition that sustainability-oriented research should also be supported by mechanisms that facilitate innovation transfer and practical application.

UP AHP Results

UP submitted a total of 8 responses to the AHP survey. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the Consistency Ratio (CR) with an acceptable threshold of 0,1. The results showed that the criteria and alternative comparison matrices had acceptable CR values. Therefore, the consistency of the judgments was considered adequate for institutional prioritisation.

UP CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,05	Acceptable
Alternatives under C1	0,0291	Acceptable
Alternatives under C2	0,007	Acceptable
Alternatives under C3	0,007	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0,007	Acceptable
Alternatives under C6	0,076	Acceptable
Alternatives under C7	0,0015	Acceptable

The AHP analysis produced the following criteria weights for UP:

Criterion	Priority Weight	Rank
Interdisciplinary collaboration (**C5**)	17,5%	1
Researcher career support (**C7**)	16,1%	2
Environmental and climate contribution (**C3**)	15,2%	3
Sustainable biomass use and circularity integration (**C2**)	14,0%	4
Innovation and investment scale-up (**C1**)	12,9%	5

Economic impact and competitiveness (**C4**)	12,8%	6
Skills development (**C6**)	11,6%	7

The criteria priorities indicate that UP places the highest strategic importance on Interdisciplinary collaboration (C5) and Researcher career support (C7), receiving the highest two weights. This suggests that the institution views collaboration and career support as the most important strategic priorities for advancing bioeconomy research.

The third- and fourth-ranked criteria, Environmental and climate contribution (C3) and Sustainable biomass use and circularity integration (C2), also received considerable importance, indicating that sustainability, circularity and climate contribution are significant but secondary to collaboration and career support.

In contrast, Economic impact and competitiveness (C4) and Skills development (C6) were assigned lower weights, suggesting that these areas are viewed as less immediate priorities for bioeconomy research development.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for UP were:

Action Plans	Global Priority	Rank
Organize interdisciplinary workshops and seminars between industry and academia (**A15**)	9,06%	1
Establish career development programs (**A19**)	8,37%	2

Develop an internal system for technology transfer and commercialisation of innovations (**A11**)	7,14%	3
Partner with local industries or municipalities to co-develop circular bio-based pilot solution (**A6**)	6,60%	4
Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance (**A8**)	6,30%	5

The highest-priority action for UP was **A15** – Organize interdisciplinary workshops and seminars between industry and academia strongly reflects the highest importance of the criterion Interdisciplinary collaboration (C5). This suggests that the institution prioritises:

- industry–academia collaboration,
- interdisciplinary networking,
- knowledge exchange,
- and cross-sectoral cooperation.

The result indicates that UP considers collaborative ecosystems and institutional coordination as critical foundations for successful bioeconomy development.

The second-ranked action, **A19** - Establish career development programs, strongly aligns with the importance of Researcher career support (C7), which received the second-highest criterion. This indicates that UP recognises:

- researcher retention,
- professional development,
- and institutional human capital strengthening

as critical factors for sustainable bioeconomy research growth.

Although Economic impact and competitiveness (C4) was ranked sixth among the criteria, one action under this criterion achieved high priority: **A11** – Develop an internal system for technology transfer and commercialisation of innovations (rank 3). This occurred because A11 received a very high local priority within C4 (55,7%), indicating strong respondent agreement regarding its importance relative to other Economic impact and competitiveness actions. The result suggests that UP considers technology transfer systems and commercialisation innovation as critical enabling mechanisms for strengthening institutional bioeconomy research capacity.

The fourth-ranked action, **A6** - Partner with local industries or municipalities to co-develop circular bio-based pilot solution, reflects the fourth-ranked criterion, Sustainable biomass use and circularity integration (C2). The strong ranking of A6 indicates that UP prioritises practical collaboration-oriented circular bioeconomy implementation through partnerships with external stakeholders.

The fifth-ranked action, **A8** - Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance, emphasises the importance of environmentally responsible practices and climate-oriented research implementation into both research methodologies and institutional operations. This priority aligns strongly with the high weight assigned to Environmental and Climate Contribution (C3) and confirms the institution's emphasis on integrating environmental and climate-oriented research implementation.

AUT AHP Results

AUT submitted a total of 10 responses to the AHP survey. Judgments from respondents were aggregated using the geometric mean method. The consistency of the aggregated judgments was evaluated using the Consistency Ratio (CR) with an acceptable threshold of 0,1 and a borderline acceptable range of less than 0,2. The results showed that the criteria had acceptable value, indicating coherent judgments regarding the relative importance of the seven evaluation criteria. For the alternatives, all matrices also achieved acceptable consistency levels except for the alternatives under Interdisciplinary Collaboration (C5), which obtained a borderline CR of 0.138. While this value exceeds the conventional threshold of 0.10, it remains below 0.20 and is therefore considered sufficiently reliable for interpretation, although the ranking of alternatives under C5 should be interpreted with slightly greater caution.

AUT CR values for criteria and alternatives comparison judgments:

Pairwise Comparison	CR Value	Interpretation
Criteria	0,032	Acceptable
Alternatives under C1	0,037	Acceptable
Alternatives under C2	0,037	Acceptable
Alternatives under C3	0,015	Acceptable
Alternatives under C4	0	Acceptable
Alternatives under C5	0,138	Borderline
Alternatives under C6	0,011	Acceptable
Alternatives under C7	0,028	Acceptable

The AHP analysis produced the following criteria weights for AUT:

Criterion	Priority Weight	Rank
Environmental and climate contribution (**C3**)	22,6%	1

Sustainable biomass use and circularity integration (**C2**)	20,5%	2
Innovation and investment scale-up (**C1**)	20,1%	3
Economic impact and competitiveness (**C4**)	12,4%	4
Interdisciplinary collaboration (**C5**)	10,0%	5
Skills development (**C6**)	7,22%	6
Researcher career support (**C7**)	7,17%	7

Environmental and Climate Contribution (C3) emerged as the highest-priority criterion, accounting for 22.6% of the total weight. This result indicates that respondents view environmental sustainability and climate-related impacts as the most important dimensions for strengthening bioeconomy research at AUT. The institution therefore, appears strongly oriented toward improving environmental performance and supporting sustainability objectives through research activities.

Sustainable Biomass Use and Circularity Integration (C2) ranked second with 20.5%. This highlights the importance placed on circular bioeconomy approaches, resource efficiency, and collaboration with external stakeholders to develop practical solutions for sustainable biomass utilization.

Innovation and Investment Scale-Up (C1) ranked third with 20.1%, demonstrating the importance of strengthening innovation capacity, pilot infrastructures, industry engagement, and investment-oriented research activities.

Economic Impact and Competitiveness (C4) ranked fourth (12.4%), reflecting interest in commercialization and technology transfer. In contrast, Skills Development (C6) and Researcher Career Support (C7) shared the lowest priority level (7.2%), suggesting that respondents viewed

environmental, circularity, and innovation challenges as more immediate strategic priorities.

The local priorities of alternatives under each criterion were synthesised with the criteria weights to obtain the global priorities of all proposed action plans.

The five highest-ranked action plans for AUT were:

Action Plans	Global Priority	Rank
Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance (**A8**)	10,60%	1
Develop an internal system for technology transfer and commercialisation of innovations (**A11**)	10,20%	2
Partner with local industries or municipalities to co-develop circular bio-based pilot solution (**A6**)	9,02%	3
Develop a pilot system for nutrient recycling and residue valorisation (**A5**)	7,80%	4
Develop pilot and demonstration infrastructures(**A1**)	6,72%	5

The highest-ranked action, **A8**, belongs to the highest-priority criterion (C3) and demonstrates a strong institutional commitment to evidence-based environmental assessment and sustainability monitoring. The result suggests that AUT considers environmental performance measurement an essential component of future bioeconomy research activities.

The second-ranked action, **A11**, achieved a very high global priority despite belonging to the fourth-ranked criterion (C4). This indicates exceptionally strong support for commercialization and technology transfer activities among respondents. The result demonstrates that while economic competitiveness may not be the institution's highest strategic criterion, establishing effective mechanisms to translate research into societal and economic value is considered a highly impactful action.

The third- and fourth-ranked actions (**A6** and **A5**) both belong to Sustainable Biomass Use and Circularity Integration (C2), the second-highest criterion. These results indicate a strong institutional preference for practical circular bioeconomy initiatives, particularly those involving external stakeholders and resource valorisation.

The fifth-ranked action, **A1**, which belongs to the third-ranked criterion (C1), highlights the importance of developing pilot and demonstration infrastructure to strengthen institutional capacity for innovation and to facilitate the testing and scaling of bioeconomy solutions.

Annex IV – Validation Workshop Report and Institutional Action Plans

AUP Validation Workshop Report and Action Plans

Workshop Details:

Workshop Type: Online Validation Workshop

Date: 9 June 2026

Platform: Microsoft Teams

Duration: 90 minutes

1. Background

As part of BEAMING Task 6.1, Agricultural University of Plovdiv (AUP) developed draft institutional action plans based on the outcomes of the Expert Workshop, SMART goals, and the Analytic Hierarchy Process (AHP) prioritisation exercise. The prioritisation process identified the most relevant and feasible actions for strengthening the university's bioeconomy research and innovation capacity.

In accordance with the BEAMING Guideline for Online Validation Workshops, an online validation workshop was organised to review, discuss, and validate the proposed action plans before their finalisation and implementation.

The workshop provided an opportunity for institutional decision-makers, academic staff, research and innovation representatives, and other relevant stakeholders to assess the relevance, feasibility, strategic alignment, and implementation readiness of the proposed actions.

2. Objectives of the Workshop

The workshop pursued the following objectives:

- Present the results of the institutional AHP prioritisation exercise.
- Present the draft action plans developed from the prioritised actions.
- Validate the relevance, feasibility, and strategic alignment of the proposed actions.
- Collect recommendations and feedback from institutional decision-makers and stakeholders.
- Identify necessary revisions and implementation considerations.
- Strengthen institutional ownership and commitment towards implementation.

3. Participants

The workshop brought together representatives from the main institutional stakeholder groups, including:

University Leadership

- Vice-Rector for Research
- Vice-Rector for Academic Affairs
- Faculty Deans

Research and Innovation Representatives

- Research Office representatives
- Technology Transfer Office representatives
- Laboratory managers
- Project management staff

Academic Representatives

- Faculty members involved in bioeconomy-related research
- Doctoral School representatives
- Curriculum development experts

Administrative Representatives

- Procurement Department
- Sustainability and Environmental Management representatives
- Financial and project administration staff

Action Plan Development Team

- Members responsible for preparation of the institutional Bioeconomy Action Plan

A total of **22 participants** attended the online workshop.

4. Workshop Agenda

Agenda	Duration (minutes)	Description
Introduction	5	• Welcome remarks • Objective of the workshop
AHP result presentation	10	• Key priority rankings • Interpretation of results for the institution
Presentation of Draft Action Plan	30	• Selected priorities with reasons • Proposed actions using implementation template
Discussion & Validation	30	• Feedback from stakeholders • Alignment with institutional strategy • Identification of gaps or adjustments
Finalisation Steps	15	• Agreement on revisions • Next steps and responsibilities

5. Presentation of AHP Prioritisation Results

The Action Plan Development Team presented the results of the AHP prioritisation process and explained the rationale for selecting the highest-ranked actions for implementation.

The following priorities were presented:

Priority Rank	Action Area
1	Partner with Local Industries and Municipalities to Co-Develop Circular Bio-Based Pilot Solutions (A6)
2	Introduction of Green Lab Standards (A10)
3	Development of Interdisciplinary Educational Programmes and Bioeconomy Teaching Modules (A16)
4	Integration of Circular Design Principles into Project Planning and Procurement (A7)
5	Technology Transfer, Commercialisation and Entrepreneurial Support Programme (A11/A12)

Participants acknowledged that the selected priorities adequately reflected both institutional needs and regional bioeconomy development opportunities.

6. Presentation of Draft Action Plans

The implementation framework for each selected priority was presented, including:

- Objectives
- Implementation activities
- Responsible units
- Timelines
- Required resources

- Expected outputs and outcomes
- Monitoring indicators
- Risks and mitigation measures

Particular attention was given to the alignment of the proposed actions with:

- AUP Strategic Development Priorities;
- EU Bioeconomy Strategy;
- European Green Deal objectives;
- Horizon Europe priorities;
- BIOEAST Strategic Research and Innovation Agenda;
- Bulgarian Smart Specialisation Strategy.

7. Discussion and Validation Results

The discussion focused on the six validation criteria proposed in the workshop guideline.

7.1 Strategic Alignment

Feedback

Participants agreed that all five selected priorities demonstrate strong alignment with:

- The university's strategic objectives;
- National and European bioeconomy priorities;
- Regional innovation and sustainability needs;
- Research excellence and innovation capacity-building goals.

Validation Outcome

✓ Fully validated

No substantial revisions required.

7.2 Feasibility of Implementation

Feedback

Participants considered the proposed actions feasible provided that:

- External project funding opportunities are actively pursued;
- Internal coordination mechanisms are strengthened;
- Clear responsibilities are assigned at the institutional level.

Special attention was recommended for:

- Securing co-financing for pilot projects;
- Providing adequate staff training for Green Lab implementation;
- Strengthening support structures for technology transfer activities.

Validation Outcome

✓ Validated with minor operational recommendations.

7.3 Availability of Resources and Capacities

Feedback

Participants recognised that existing institutional expertise provides a solid foundation for implementation.

However, additional resources may be required in:

- Technology transfer and intellectual property management;

- Sustainability monitoring and laboratory certification;
- Development of interdisciplinary teaching materials;
- Industry engagement and partnership management.

Recommendation

Develop a resource mobilisation plan linked to national and European funding opportunities.

Validation Outcome

✓ Validated with resource planning recommendations.

7.4 Institutional Impact

Feedback

Stakeholders agreed that the proposed actions could generate significant institutional benefits, including:

- Increased research relevance and societal impact;
- Improved industry collaboration;
- Enhanced educational quality;
- Greater visibility in European bioeconomy initiatives;
- Increased opportunities for innovation commercialisation.

Particular support was expressed for:

- Circular bio-based pilot projects;
- Green Lab Standards;
- Bioeconomy teaching modules.

Validation Outcome

✓ Strongly validated.

7.5 Timeline and Implementation Realism

Feedback

The proposed implementation timelines (2026–2029) were considered realistic and achievable.

Participants recommended:

- Establishing annual implementation milestones;
- Conducting regular progress reviews;
- Introducing annual stakeholder consultation meetings.

Validation Outcome

✓ Validated with monitoring enhancements.

7.6 Risks and Mitigation Measures

Feedback

Participants reviewed the identified risks and proposed additional mitigation measures.

Additional recommendations included:

- Developing contingency funding strategies;
- Establishing formal partnership agreements at an early stage;
- Creating incentives for staff participation;
- Strengthening communication and awareness activities.

Validation Outcome

✓ Validated with additional mitigation recommendations.

8. Agreed Revisions and Adjustments

Following discussion, participants agreed on the following adjustments before finalisation:

Area	Agreed Revision
Governance	Establish a Bioeconomy Action Plan Steering Committee with representation from academia, industry, government, and civil society.
Monitoring	Introduce annual implementation reviews and KPI monitoring.
Funding	Prepare a resource mobilisation and funding strategy.
Stakeholder Engagement	Organise annual stakeholder forums involving Quadruple Helix actors.
Technology Transfer	Strengthen IP and commercialisation support through external expertise where needed.
Education	Expand collaboration with industry in curriculum development and lifelong learning programmes.

9. Overall Validation Conclusion

Participants unanimously agreed that the proposed Action Plan Implementation framework provides a robust and realistic roadmap for strengthening Agricultural University of Plovdiv's bioeconomy research and innovation capacity.

The workshop confirmed that the selected priorities:

- Address key institutional development needs;
- Reflect stakeholder expectations;
- Are feasible within the proposed implementation period;
- Contribute to regional and European bioeconomy objectives;

- Provide measurable and sustainable long-term impact.

The draft action plans were therefore validated and approved for finalisation, subject to incorporation of the agreed recommendations and minor adjustments identified during the workshop.

10. Next Steps

The following actions were agreed:

1. Incorporate validation workshop recommendations into the final Action Plan document.
2. Finalise the institutional Action Plan Implementation package.
3. Establish the Bioeconomy Action Plan Steering Committee.
4. Initiate preparation of implementation roadmaps and funding applications.
5. Submit the final validated Action Plan in accordance with BEAMING Task 6.1 requirements.

11. Workshop Outcome

Validation Status: APPROVED

The draft institutional action plans were successfully validated by the participants and are recommended for final adoption and implementation by Agricultural University of Plovdiv.

Prepared by:

BEAMING Task 6.1 Action Plan Team of Agricultural University of Plovdiv (AUP)

Date: 10 June 2026

AUP Bioeconomy Research Action Plan:

Based on the AUP Expert Workshop Report and the AUP AHP Prioritisation Results, the most appropriate approach is to build the implementation plan around the **five highest-ranked AHP priorities**, while ensuring alignment with the SMART goals and strategic directions identified during the workshop. The selected priorities are A6, A10, A16, A7, and A11/A12.

SELECTED PRIORITIES

AHP Rank	Action Area	Selection Reason
1	Partner with local industries or municipalities to co-develop circular bio-based pilot solutions (A6)	Highest-ranked action; directly supports circular bioeconomy implementation, stakeholder engagement, and regional innovation.
2	Introduce Green Lab Standards (A10)	Supports environmental sustainability, climate contribution, and institutional leadership in responsible research practices.
3	Develop Interdisciplinary Educational Programmes and Bioeconomy Teaching Modules (A16)	Addresses skills development and long-term human capital needs identified in the workshop.
4	Integrate Circular Design Principles into Project Planning and Procurement (A7)	Embeds circularity across institutional operations and research activities.
5	Develop Technology Transfer and Commercialisation System & Entrepreneurial Support Programmes (A11/A12)	Strengthens innovation uptake, industry engagement, and economic impact of research results.

Field	Description
Priority Rank	1
Action Area	Partner with Local Industries and Municipalities to Co-Develop Circular Bio-Based Pilot Solutions
Objective	To establish practical demonstration projects that accelerate circular bioeconomy innovation and biomass valorisation in the Plovdiv region.
Description of Action	Develop collaborative pilot projects involving AUP, municipalities, agri-food companies, farmers' organisations, and SMEs to test circular bio-based solutions.
Actions	• Map potential industry and municipal partners • Establish cooperation agreements • Identify priority biomass streams and regional challenges • Develop and submit pilot project proposals • Launch at least three demonstration projects
Responsible Unit / Person	Vice-Rector for Research; Faculties; Technology Transfer Office; Regional Bioeconomy Hub Plovdiv
Timeline	2026–2028
Required Resources	Project funding; pilot infrastructure; research staff; industry co-financing; stakeholder workshops
Expected Outputs	• Minimum 3 pilot projects launched • Cooperation agreements signed • Demonstration sites established
Expected Outcomes	• Increased biomass valorisation • Improved industry-academia collaboration • Enhanced regional bioeconomy innovation ecosystem
Monitoring Indicators	Number of pilot projects; number of partners involved; external funding secured; TRL progression
Potential Risks / Challenges	Limited industry engagement; funding delays; regulatory barriers
Mitigation Measures	Early stakeholder engagement; diversified funding sources; support from regional authorities

Field	Description
Priority Rank	2
Action Area	Introduction of Green Lab Standards
Objective	To reduce the environmental footprint of research activities and improve sustainability performance across AUP laboratories.

Description of Action	Implement university-wide green laboratory standards covering energy efficiency, sustainable procurement, waste reduction, and environmental monitoring.
Actions	• Conduct sustainability audit of laboratories • Develop Green Lab Guidelines • Train laboratory personnel • Introduce monitoring and certification procedures • Annual performance assessment
Responsible Unit / Person	Rectorate; Laboratory Managers; Environmental Sustainability Committee
Timeline	2026–2027
Required Resources	Training budget; monitoring tools; sustainability experts; communication materials
Expected Outputs	• Green Lab Guidelines adopted • Laboratory staff trained • Monitoring system operational
Expected Outcomes	• Reduced energy and resource consumption • Lower laboratory waste generation • Improved environmental performance
Monitoring Indicators	Energy consumption reduction (%); waste reduction (%); number of certified laboratories
Potential Risks / Challenges	Resistance to operational changes; limited investment resources
Mitigation Measures	Awareness campaigns; phased implementation; demonstration of cost savings

Field	Description
Priority Rank	3
Action Area	Development of Interdisciplinary Educational Programmes and Bioeconomy Teaching Modules
Objective	To strengthen bioeconomy-related competencies and interdisciplinary skills among students and researchers.
Description of Action	Integrate bioeconomy concepts, circular economy principles, sustainability assessment, and innovation management into MSc, PhD, and lifelong learning programmes.
Actions	• Curriculum review • Development of new teaching modules • Establish interdisciplinary teaching teams • Introduce case studies and project-based learning • Launch lifelong learning courses
Responsible Unit / Person	Faculties; Doctoral School; Academic Affairs Department

Timeline	2026–2028
Required Resources	Academic staff time; curriculum development funding; teaching materials; digital learning platforms
Expected Outputs	• New bioeconomy modules developed • Updated MSc and PhD curricula • Lifelong learning courses introduced
Expected Outcomes	• Improved student competencies • Enhanced employability • Stronger bioeconomy workforce development
Monitoring Indicators	Number of modules developed; student enrolment; graduate feedback; industry satisfaction
Potential Risks / Challenges	Administrative approval delays; limited interdisciplinary participation
Mitigation Measures	Early faculty engagement; pilot implementation; continuous evaluation

Field	Description
Priority Rank	4
Action Area	Integration of Circular Design Principles into Project Planning and Procurement
Objective	To institutionalise circular economy principles across research and operational activities.
Description of Action	Incorporate circularity criteria into project design, procurement procedures, infrastructure planning, and resource management.
Actions	• Develop circular procurement guidelines • Revise project application templates • Train administrative and research staff • Introduce circularity assessment checklist
Responsible Unit / Person	Research Office; Procurement Department; Faculties
Timeline	2026–2027
Required Resources	Staff training; guideline development; expert consultancy
Expected Outputs	• Circular procurement policy adopted • Assessment tools developed • Staff trained
Expected Outcomes	• Increased resource efficiency • Reduced environmental impacts • Stronger alignment with EU Green Deal objectives
Monitoring Indicators	Number of projects applying circular criteria; procurement compliance rate; resource savings achieved
Potential Risks / Challenges	Limited awareness; procurement restrictions
Mitigation Measures	Capacity-building activities; policy support from leadership
Field	**Description**

Priority Rank	5
Action Area	Technology Transfer, Commercialisation and Entrepreneurial Support Programme
Objective	To increase the societal and economic impact of AUP research through improved innovation uptake and commercialisation.
Description of Action	Establish an integrated support system for intellectual property management, technology transfer, spin-offs, start-ups, and entrepreneurship development.
Actions	• Develop technology transfer procedures • Strengthen TTO services • Organise entrepreneurship training • Establish mentoring programme • Support spin-off creation and industry engagement
Responsible Unit / Person	Technology Transfer Office; Research Office; External Business Partners
Timeline	2026–2029
Required Resources	Innovation support staff; legal/IP expertise; entrepreneurship mentors; seed funding
Expected Outputs	• Commercialisation framework established • Entrepreneurship programme launched • Industry mentoring network created
Expected Outcomes	• Increased patent applications • More industry collaborations • Higher research commercialisation rates
Monitoring Indicators	Number of patents; licences; spin-offs; industry contracts; entrepreneurial training participants
Potential Risks / Challenges	Limited innovation culture; insufficient commercialisation expertise
Mitigation Measures	Capacity building; external expert support; incentives for researchers

Overall Implementation Governance

To ensure coherence with the workshop recommendations, AUP should establish a **Bioeconomy Action Plan Steering Committee** comprising representatives from academia, industry, government, and civil society. The committee should meet twice annually to review progress, validate indicators, and align implementation with EU Bioeconomy Strategy, Horizon Europe, BIOEAST, Green Deal, and Bulgarian Smart Specialisation priorities.

Annual Key Performance Indicators (2026–2029)

- ≥ 3 circular bioeconomy pilot projects launched.
- ≥ 5 long-term industry and municipal partnerships established.
- 100% of major laboratories assessed against Green Lab standards.
- ≥ 5 new bioeconomy teaching modules introduced.
- Circularity criteria integrated into all major bioeconomy project proposals.
- ≥ 10 technology transfer or commercialisation initiatives supported.
- Annual Bioeconomy Progress Report published.
- Annual stakeholder forum organised with Quadruple Helix participation.

This implementation plan integrates the AHP prioritisation results with the SMART goals and strategic directions generated during the AUP Expert Workshop, ensuring both institutional feasibility and long-term strategic impact.

BME Validation Workshop Report and Action Plans

Workshop Details:

Participants

Name	Faculty	Department / Research Group	Position
Balázs Imre	Faculty of Chemical Technology and Biotechnology	Department of Physical Chemistry and Materials Science	Associate Professor
Brigitta Bodzay	-	Center for University–Industry Cooperation (FIEK)	Direktor at FIEK, Innovation Manager
Fehér Anikó	Faculty of Chemical Technology and Biotechnology	Department of Physical Chemistry and Materials Science	Researcher
Mariann Szabó	Faculty of Economic and Social Sciences	Department of Environmental Economics and Sustainability	Associate Professor
Edit Cséfalvay	Faculty of Mechanical Engineering	Department of Energy Engineering	Associate Professor, Vice Head of Department
Viktória Feigl	Faculty of Chemical Technology and Biotechnology	Department of Applied Biotechnology and Food Science	Associate Professor
Katalin Litauszki	Faculty of Mechanical Engineering	Department of Polymer Engineering	Assistant Professor

Workshop Objectives

The workshop validated the draft BME Bioeconomy Research Action Plan, assessed the feasibility of the proposed actions and collected expert feedback before finalisation.

Stakeholder Expertise

The workshop brought together experts representing biotechnology, chemical engineering, mechanical engineering, sustainability, environmental sciences, polymer engineering, innovation management, and university–industry collaboration. Most of the participants are members of the BME Bioeconomy Working Group, providing an interdisciplinary perspective on bioeconomy-related research, education and innovation activities across the University. Their multidisciplinary expertise ensured that the Action Plan was evaluated from educational, research, innovation, and institutional management perspectives.

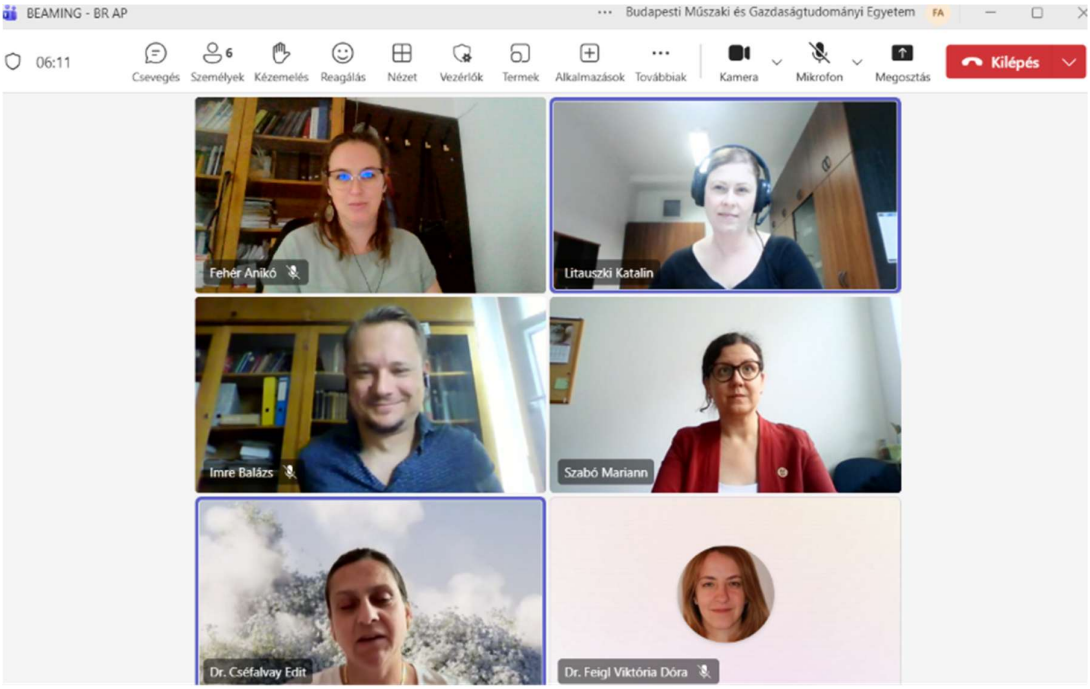
Main Feedback

- The proposed Bioeconomy Platform builds on the existing institutional capacities rather than creating a new organisational unit.
- Several planned activities are already supported through FIEK initiatives and should be integrated into the platform.
- A joint international partner database should be developed to strengthen proposal preparation and consortium building.
- A thematic communication channel should be established as an early implementation step after identifying bioeconomy researchers.
- Microsoft Teams can serve as the initial communication platform, while international solutions involving industrial partners should also be explored.
- The ongoing work on connecting research projects should continue within the future Research & Collaboration Layer.
- Proposal development, international networking and consortium building should remain key priorities.

Validation Outcome

The participants endorsed the overall strategic direction of the Action Plan. The received comments refined implementation details and confirmed that the proposed actions are realistic, complementary to existing initiatives and suitable for phased implementation.

Validation Workshop Picture



Bioeconomy Research Action Plan – BME

SELECTED PRIORITIES

Priority rank	Action Areas	Selection Reason
1	Circular bioeconomy and industry collaboration	Strengthening cooperation with local industries and municipalities to co-develop circular bio-based pilot solutions and applied innovation projects.
2	Bioeconomy education and skills development	Developing interdisciplinary educational modules, pilot courses, and practice-oriented learning opportunities connected to bioeconomy challenges.

3	Institutional coordination and knowledge integration	Establishing institutional coordination mechanisms and platforms to connect faculties, research groups, and external stakeholders working in bioeconomy.
4	Researcher support and innovation capacity	Supporting career development, proposal-writing skills, networking, and innovation-oriented research activities for researchers and early-career scientists.

The BME Bioeconomy Platform aims to establish an institutional collaboration and knowledge-sharing system that connects departments, faculties, research groups, students, and industrial stakeholders working in the field of bioeconomy.

The platform would function as an internal "bioeconomy operating system" that makes institutional competencies visible, supports interdisciplinary education and research, facilitates project and consortium building, and strengthens industrial and international collaborations.

The initiative is designed to build on already existing institutional capacities, courses, research infrastructures, and collaborations. Therefore, it can generate significant strategic added value for BME with relatively low resource requirements.

In the long term, the platform aims to strengthen BME's position within the national and European bioeconomy ecosystem, particularly in relation to Horizon Europe, BIOEAST, EELISA, and industry-driven innovation collaborations.

RECOMMENDED ACTIONS

Field	Description
Priority Rank	1
Action Area	Establish the BME Bioeconomy Platform
Objective	To establish a lightweight institutional bioeconomy platform that connects bioeconomy-related competencies, educational activities, research capacities, and collaboration opportunities across BME.
Description of Action	The BME Bioeconomy Platform will function as an informal institutional coordination and networking framework supporting the visibility, integration, and strategic alignment of bioeconomy-related activities across the university. The platform will serve as a foundational structure for future development of dedicated educational, research, proposal-generation, industrial collaboration, and career-development layers. Rather than operating as a separate institute or administrative unit, the platform will function as a flexible collaboration system built on existing institutional capacities, networks, and initiatives. The platform aims to strengthen internal connectivity between faculties, departments, research groups, students, and external stakeholders while increasing the visibility of BME's bioeconomy-related expertise and activities.
Actions	1. Define the operational scope, structure, and strategic objectives of the BME Bioeconomy Platform. 2. Identify and connect participating faculties, departments, research groups, and institutional stakeholders involved in bioeconomy-related activities. 3. Develop the initial framework and architecture of the platform, including future educational, research, proposal-generation, industrial collaboration, and career-development layers. 4. Establish internal communication and coordination mechanisms supporting interdisciplinary interaction and information exchange. 5. Create the initial institutional visibility framework for presenting BME bioeconomy-related competencies, activities, and infrastructures. 6. Build connections with existing initiatives and cooperation structures.
Responsible Unit / Person	Vice-Rector for Research and Innovation; BME Bioeconomy Working Group; Center for University-Industry Cooperation; relevant faculties and departments
Timeline	Short- to medium-term implementation: 0–36 months
Required Resources	Part-time platform coordinator/support person Internal digital communication and database tools

	Institutional support from participating faculties and departments
Expected Outputs	Operational framework of the BME Bioeconomy Platform Institutional stakeholder network Initial platform structure and architecture Internal communication and coordination mechanisms
Expected Outcomes	Improved institutional visibility of bioeconomy-related activities Stronger interdisciplinary connectivity across BME Enhanced institutional readiness for collaborative education and research initiatives
Monitoring Indicators	Number of participating faculties, departments, and research groups. Number of connected stakeholders and research groups. Development progress of platform structure and future layers.
Potential Risks / Challenges	Limited participation and engagement from different units. Lack of regular information sharing. Limited coordination capacity and administrative support.
Mitigation Measures	Build on existing collaborations and networks. Demonstrate quick wins through proposal support and visibility activities.

Field	Description
Priority Rank	2
Action Area	Development of the BME Bioeconomy Knowledge & Education Layer
Objective	To create a visible, modular, interdisciplinary bioeconomy learning ecosystem across BME faculties that supports student mobility, cross-faculty collaboration, and bioeconomy competence development.
Description of Action	The action aims to identify, organise, and connect existing bioeconomy-related educational activities across the university into a unified learning framework. The system would function as a lightweight educational layer built primarily on already existing courses and institutional capacities. The platform would introduce a "bioeconomy label" for relevant subjects and create modular learning pathways that students from different faculties can combine. In the medium term, the initiative could evolve into an institutional bioeconomy certificate or microcredential system attached to existing degree programmes.
Actions	1 – Mapping and preparation (0–3 months) • Identify all bioeconomy-related courses across BME faculties • Develop classification criteria and "bioeconomy label" • Create initial database of courses and lecturers • Establish faculty contact points

	2 – Structure development (3–6 months) • Define modular learning pathways • Identify prerequisite structures and cross-faculty compatibility • Develop recommendation logic for interdisciplinary course combinations • Create initial visual course map 3 – Pilot implementation (6–12 months) • Launch pilot platform interface • Promote the initiative among students • Collect student feedback • Develop proposal for certificate/microcredential recognition
Responsible Unit / Person	Vice-Rector for Education, Deans of the Participating Faculties, Bioeconomy Platform Coordinator
Timeline	Short-term implementation (0–12 months)
Required Resources	1 part-time coordinator, Faculty contact persons, Basic digital interface using existing university systems
Expected Outputs	Institutional database of bioeconomy-related courses Bioeconomy course label system Interdisciplinary course pathway structure Pilot online educational interface
Expected Outcomes	Increased visibility of BME bioeconomy education Stronger interdisciplinary student participation Foundation for future bioeconomy specialisation programmes
Monitoring Indicators	Number of mapped courses Number of participating faculties Number of students using the platform
Potential Risks / Challenges	Limited faculty engagement Administrative resistance to cross-faculty recognition
Mitigation Measures	Early involvement of faculty leadership Integration into existing educational frameworks Demonstration of added institutional value

Field	Description
Priority Rank	3
Action Area	Development of the BME Bioeconomy Research & Collaboration Layer
Objective	To establish a digital research and collaboration layer within the BME Bioeconomy Platform that connects bioeconomy-related competencies, infrastructures, pilot capacities, and project-building activities across BME.

Description of Action	The BME Bioeconomy Research & Collaboration Layer will function as an integrated module of the BME Bioeconomy Platform. The platform will provide a searchable and visible collaboration environment where researchers, departments, faculties, and external stakeholders can identify institutional competencies, infrastructures, pilot capacities, and collaboration opportunities related to bioeconomy. The Research & Collaboration Layer will include: competence map research group and expertise profiles infrastructure and pilot capacity mapping open equipment visibility partner-search functionalities proposal matchmaking support consortium-building support collaboration marketplace functionalities The system will build on the already existing BME competence map while extending it into a broader interdisciplinary and project-oriented collaboration platform supporting research visibility, networking, and proposal generation, and it will be connected with the BEAMING Alliance call-monitoring system, providing visibility of relevant funding opportunities and facilitating partner identification and proposal development.
Actions	1. Update and expand the existing BME competence map with bioeconomy-related competencies, departments, and research groups. 2. Collect and structure information on infrastructures, laboratories, pilot facilities, and open equipment available across faculties. 3. Develop standardised research and proposal one-pagers summarising research focus, expertise, available infrastructures, and potential project contributions. 4. Develop the platform's searchable collaboration and partner-search interface. 5. Create proposal matchmaking and consortium-building functionalities supporting Horizon Europe, Interreg, and national funding applications.
Responsible Unit / Person	Vice-Rector for Research and Innovation; Research Support Office; BME Bioeconomy Working Group; participating faculties and departments

Timeline	Short- to medium-term implementation: 0–24 months
Required Resources	Part-time platform coordinator Administrative and data collection support
Expected Outputs	Research & Collaboration Layer integrated into the BME Bioeconomy Platform Updated BME Bioeconomy Competence Map Database of bioeconomy-related infrastructures and pilot capacities Research and proposal one-pager portfolio
Expected Outcomes	Stronger interdisciplinary collaboration across faculties Faster and more efficient consortium development
Monitoring Indicators	Number of mapped research groups and departments Number of infrastructures and equipment entries collected
Potential Risks / Challenges	Incomplete institutional data collection Limited coordination capacity
Mitigation Measures	Build on already existing competence map structures and collaborations Use simple and low-administration data collection processes

In the future, the BME Bioeconomy Platform could be expanded with additional layers supporting talent development, institutional coordination, and external collaboration.

A possible **Career & Talent Layer** could include researcher profiles, skills, project experience, mentoring activities, mobility, industrial collaborations, and innovation contributions. The platform could also support competence-based team assembly, project role allocation, and interdisciplinary collaboration building.

The platform could further evolve into an institutional support intelligence system helping identify missing capacities, such as lack of project management support, industrial partnerships, mentoring, infrastructure, or funding experience.

An additional External Collaboration Layer could strengthen connections with BIOEAST, Horizon Europe, EELISA, industry, startups, municipalities, agriculture-related actors, NGOs, and other regional and international stakeholders. This layer could also support stakeholder

engagement activities, industry matchmaking, innovation partnerships, and long-term cooperation building.

EDU Validation Workshop Report and Action Plans

INSTITUTIONAL PROFILE AND ROLE IN BIOECONOMY RESEARCH

Educons University is a modern higher education institution in Serbia, committed to excellence in education, research, and innovation, with a strong focus on economics, management, innovation, and sustainable development. With 23 accredited study programmes, more than 2,000 students, and experienced academic staff, Educons has developed capacities in interdisciplinary research addressing contemporary societal and economic challenges. The University plays an active role in the development of bioeconomy through an interdisciplinary approach, integrating economic and management sciences with technological and environmental dimensions. Its research and innovation activities are particularly oriented towards applied research, innovation uptake, and knowledge valorisation, with the aim of translating research results into practical solutions for society, industry, and public administration. In the regional context of SEE, CEE and the Western Balkans, Educons University positions itself as a knowledge-driven institution supporting green and digital transition, capacity building, and the strengthening of bioeconomy-related research and innovation ecosystems.

1.1 Thematic Areas of Bioeconomy Engagement

Current bioeconomy-related thematic areas at Educons include:

Economic, management and governance aspects of bioeconomy

- Sustainable economic development and bioeconomy
- Circular economy and bio-based value chains
- Twin transition

Environmental sustainability and climate-related domains

- Environmental protection (water, soil, air, microplastics, pesticide residues)
- Climate change mitigation and adaptation
- Energy transition and energy efficiency in bioeconomy contexts

Agri-food systems and biological resources

- Sustainable agri-food systems
- Organic, precision and regenerative agriculture
- Bio-based production systems

Biotechnology and life sciences

- Biotechnology and life sciences relevant to bio-based solutions and environmental sustainability

Digitalisation supporting bioeconomy

- Information technologies and digital solutions for bioeconomy
- Data-driven innovation ecosystems

Security

- resilience of bio-based systems
- critical infrastructure / food & energy security

Education and capacity building

- Education and training, including teachers' training, related to sustainability and bioeconomy topics



Bioeconomy Research Action Plan – Educons University

SELECTED PRIORITIES

Priority rank in AHP	Action Area	Selection Reason
1	Develop an internal system for technology transfer and commercialization of innovations (A11)	Ranked first in the AHP analysis (global priority 7.14%) and strongly aligned with the institution's Technology Transfer Hub and Project Incubator Hub. It directly responds to the workshop's central conclusion that knowledge valorisation is the weakest link, turning research outputs into market-ready solutions.
2	Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (A10)	Ranked second in the AHP (6.44%) and reflects the institution's top-weighted criteria of sustainability and environmental/climate contribution. It is realistic and quick to implement across existing laboratories (Center for

		Microplastics, analytical, biotechnological, chemical labs).
3	Develop a pilot system for nutrient recycling and residue valorisation (A5)	Ranked third in the AHP (6.37%) under the highest-weighted criterion (sustainable biomass use and circularity). It operationalises the circular bioeconomy priority and matches the workshop call for thematically focused living labs and concrete pilot demonstrators.
4	Establish entrepreneurial support programs (A12)	Ranked fourth in the AHP (6.25%) and complements A11. It addresses the entrepreneurial gap identified in the SWOT and the QH stakeholders' emphasis on start-ups, spin-offs and bridging young researchers/PhD students to the market.

ACTION PLANS IMPLEMENTATION

Field	Description
Priority Rank	1 (Highest priority according to AHP results)
Action Area	Develop an internal system for technology transfer and commercialization of innovations
Objective	To strengthen institutional capacity for transferring bioeconomy research results into practice and the market by establishing a functional, well-resourced technology transfer and commercialization system.
Description of Action	Build on the existing Technology Transfer Hub and Project Incubator Hub to create an internal pipeline that identifies, protects and commercializes bioeconomy research outputs, links researchers with industry partners, and supports patenting, licensing and spin-off creation in the field of bioeconomy and circular economy.
Actions	• Map existing research outputs with commercialization potential across faculties and laboratories • Define internal IP, licensing and spin-off procedures and a clear service portfolio • Strengthen the Technology Transfer Hub with dedicated staff and standardized knowledge-to-market tools (one-pager / tech-offer formats) • Pilot standardized commercial services (mini-LCA, circularity assessments, eco-recommendations, water/soil analyses) with defined price lists and target groups

	• Establish matchmaking channels with industry, the BIOECONOMY Cluster and the National Center for Bioeconomy • Introduce a mechanism for university participation in spin-offs and engage PhD students as a bridge to the market
Responsible Unit / Person	Technology Transfer Hub / Project Incubator Hub Vice-Rector for Research / Center for Circular Economy
Timeline	Short to medium-term (0–18 months)
Required Resources	• Dedicated technology-transfer staff (e.g. 1 TT officer, legal/IP support) • Operational budget for IP protection, prototyping and promotion • Access to laboratory and pilot infrastructure • Templates and digital tools for tech-offer and service management
Expected Outputs	• Operational technology transfer and commercialization system with defined procedures • Portfolio of standardized commercial services with price lists • Internal registry of commercializable research outputs and tech-offers
Expected Outcomes	• Increased number of research results transferred to practice and the market • Growth in licensing agreements, spin-offs and commercial contracts • Stronger and more visible cooperation between the university and industry
Monitoring Indicators	• Number of tech-offers / one-pagers produced • Number of commercial contracts, licenses and spin-offs • Revenue generated from commercial services • Number of PhD students engaged in commercialization activities
Potential Risks / Challenges	• Limited entrepreneurial culture and skills within the academy • Unclear or burdensome IP and university-equity procedures • Insufficient or short-term funding for commercialization
Mitigation Measures	• Couple the system with entrepreneurial training (see Priority 4) • Develop clear, simple IP and spin-off rules and a university-share model • Combine institutional resources with EU and national innovation funding

Field	Description
Priority Rank	2
Action Area	Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices
Objective	To improve the environmental and climate performance of the university's research operations by introducing green laboratory standards across all bioeconomy-relevant laboratories.
Description of Action	Develop and implement a set of green lab standards covering energy efficiency, sustainable materials and consumables, and waste reduction and segregation, applied across the Center for Microplastics and the analytical, chemical, microbiological and biotechnological laboratories, so that the research infrastructure itself embodies circular and climate-conscious practice.
Actions	• Conduct a baseline assessment of energy use, materials and waste in existing laboratories • Define a green lab standard and checklist (energy efficiency, sustainable materials, waste reduction and segregation) • Pilot the standard in the Center for Microplastics and one additional laboratory • Train laboratory staff and researchers on the new practices • Introduce a green-lab certification/recognition scheme and roll it out across laboratories
Responsible Unit / Person	Center for Microplastics / Laboratory coordinators Vice-Rector for Research
Timeline	Short-term (0–12 months)
Required Resources	• Coordinator for green lab implementation • Modest budget for energy-efficient and sustainable laboratory equipment and consumables • Waste-management and monitoring support
Expected Outputs	• Adopted green lab standard and checklist • At least two laboratories operating under green lab standards • Trained laboratory staff
Expected Outcomes	• Reduced energy use and laboratory waste • Improved environmental performance and sustainability of research operations • Increased institutional visibility as a sustainability champion
Monitoring Indicators	• Share of laboratories applying green lab standards • Reduction in energy consumption and waste volumes • Number of staff trained
Potential Risks / Challenges	• Upfront costs for equipment upgrades • Resistance to changing established laboratory routines
Mitigation Measures	• Phase implementation and start with low-cost measures

	• Engage laboratory staff early and link standards to recognition and cost savings

Field	Description
Priority Rank	3
Action Area	Develop a pilot system for nutrient recycling and residue valorisation
Objective	To advance circular bioeconomy implementation by developing a pilot system for nutrient recycling and the valorisation of agricultural and bio-based residues, demonstrated in real conditions.
Description of Action	Establish a thematically focused living lab / pilot system that converts agricultural residues and bio-based waste into reusable nutrients and bio-products (e.g. bio-fertilizers), co-developed with regional agri-food partners, municipalities and producers, and concluded with case studies and policy and economic recommendations.
Actions	• Identify suitable residue streams and partner sites with agri-food industry, municipalities and innovative farmers • Design the pilot nutrient-recycling and residue-valorisation system • Set up and operate the living lab at selected pilot ecological locations • Monitor performance using LCA, carbon footprinting and circularity indicators • Produce case studies, an untapped-potential report and policy/economic recommendations
Responsible Unit / Person	Center for Circular Economy / Research teams (agriculture, environmental protection) In cooperation with regional industry and producers
Timeline	Medium-term (6–24 months)
Required Resources	• Pilot equipment and field/laboratory facilities • Research staff and PhD students • Operational budget for the living lab and monitoring • Partner sites and feedstock from agri-food partners
Expected Outputs	• Functional pilot system for nutrient recycling and residue valorisation • Living lab established at pilot ecological locations • Case studies and an untapped-potential report
Expected Outcomes	• Demonstrated circular solutions for resource recovery and nutrient reuse • Stronger cooperation with agri-food industry and local communities • Evidence base for policy and scaling of circular bioeconomy practices

Monitoring Indicators	• Volume of residues valorised and nutrients recovered • Number of pilot sites and partners engaged • Number of case studies and recommendations produced
Potential Risks / Challenges	• Dependence on continuous feedstock supply and partner commitment • Technical and regulatory barriers to residue valorisation • Conflict between bio-resource sourcing and food production
Mitigation Measures	• Secure feedstock through formal agreements with partners • Apply environmental impact assessment and circularity safeguards • Prioritise residue streams that do not compete with food production

Field	Description
Priority Rank	4
Action Area	Establish entrepreneurial support programs
Objective	To foster a bioeconomy entrepreneurial culture and support the creation and growth of bio-based start-ups and spin-offs, complementing the technology transfer system (Priority 1).
Description of Action	Develop structured entrepreneurial support programs (training, mentorship, incubation and seed support) for researchers, PhD students and staff, delivered through the Project Incubator Hub and Technology Transfer Hub, to close the entrepreneurial gap identified in the institutional analysis and stakeholder workshop.
Actions	• Design entrepreneurship and bio-business training modules (incl. green procurement and ESG topics) • Set up mentorship and incubation support for bioeconomy start-ups and spin-offs • Introduce internal seed funding or vouchers for early-stage bio-based ideas • Connect participants with industry, investors and the BIOECONOMY Cluster • Engage PhD students and young researchers as a bridge to the market
Responsible Unit / Person	Project Incubator Hub / Technology Transfer Hub Human Resources Development Center
Timeline	Short to medium-term (0–18 months)
Required Resources	• Trainers and mentors (internal and external) • Seed/voucher budget for early-stage initiatives • Incubation space and administrative support

Expected Outputs	• Operational entrepreneurial support program with training and mentorship • Cohort of supported bioeconomy start-up/spin-off ideas • Seed-funding or voucher scheme in place
Expected Outcomes	• Increased number of bio-based start-ups and spin-offs • Stronger entrepreneurial culture among researchers and students • Improved retention of young researchers and talent
Monitoring Indicators	• Number of participants trained and mentored • Number of start-ups/spin-offs created or supported • Amount of seed funding allocated and leveraged
Potential Risks / Challenges	• Limited entrepreneurial experience among staff • Difficulty sustaining funding for seed support • Low uptake if incentives are unclear
Mitigation Measures	• Partner with experienced mentors and the start-up ecosystem • Blend institutional, EU and national funding for sustainability • Link participation to clear incentives and visible success stories

The AHP analysis identified the most strategic bioeconomy research action plans for Educons University. The highest-priority action plans were:

1. Develop an internal system for technology transfer and commercialization of innovations
2. Introduce green lab standards
3. Develop a pilot system for nutrient recycling and residue valorisation
4. Establish entrepreneurial support programs
5. Establish institutional monitoring of biodiversity or ecosystem services linked to research activities

These priorities indicate that Educons University's bioeconomy research strategy is strongly oriented toward:

- improving commercialization of research outputs,
- integrating sustainability into research infrastructure,
- and strengthening circular bioeconomy implementation systems.

Overall, the results provide evidence-based guidance for institutional planning and suggest that investments in innovation transfer systems,

sustainable research infrastructure, and circular bioeconomy initiatives should be prioritised to strengthen Educons University's bioeconomy research capacity.

UKIM Validation Workshop Report and Action Plans

Workshop details:

Institution: Faculty of Agricultural Sciences and Food – Skopje (FASF), Ss. Cyril and Methodius University in Skopje (UKIM

Workshop Type: In person

Date: 23 June 2026

Participants: 8

Duration: 90 minutes

Prepared by: FASF/UKIM

1. Background

As part of BEAMING Task 6.1, the Faculty of Agricultural Sciences and Food – Skopje (FASF), Ss. Cyril and Methodius University in Skopje (UKIM), developed draft Institutional Bioeconomy Research Action Plan based on the outcomes of the institutional Expert Workshop, the resulting SMART goals, and the Analytic Hierarchy Process (AHP) prioritisation exercise. The AHP methodology, applied across seven strategic criteria and twenty-one alternatives, provided a transparent and evidence-based framework for identifying the actions most relevant to strengthening FASF's bioeconomy research and innovation capacity.

To ensure that the proposed actions were both strategically relevant and realistically achievable, an institutional validation workshop was organised in accordance with the BEAMING Guidelines for Institutional Validation Workshop. The workshop brought together institutional decision-makers, research and innovation representatives, and other stakeholders (governmental body) to review, discuss and validate the draft action plan derived from the AHP results. Participants assessed the proposed actions in terms of strategic alignment, feasibility, resource availability, expected impact, timeline realism, risks, and sustainability.

2. Objectives of the Workshop

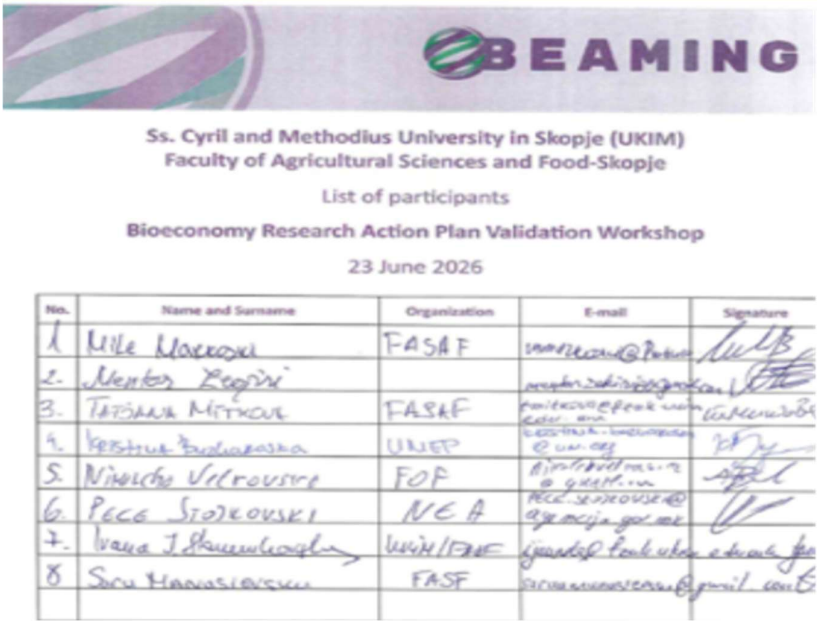
- Present the results of the institutional AHP prioritisation exercise;
- Present the draft action plan developed from the prioritised actions;

- Validate the relevance, feasibility, and strategic alignment of the proposed actions;
- Collect recommendations and feedback from institutional decision-makers and stakeholders;
- Identify necessary revisions and implementation considerations;
- Strengthen institutional ownership and commitment towards implementation.

3. List of Participants

The workshop was held in person and gathered 8 participants representing institutional leadership, research and innovation management, and other stakeholders, in line with the composition recommended in the BEAMING validation workshop guidelines:

Participant Category	Representative Roles	Approx. Number
Institutional decision makers	Dean / Vice-Dean of FASF	2
Other stakeholders	BR users	2
Academic / research staff	Researchers involved in bioeconomy-related projects (Faculty of Forestry and FASF)	3
Governmental body	National Extension Agency	1



Ss. Cyril and Methodius University in Skopje (UKIM)
Faculty of Agricultural Sciences and Food-Skopje

List of participants

Bioeconomy Research Action Plan Validation Workshop

23 June 2026

No.	Name and Surname	Organization	E-mail	Signature
1.	Mile Markoski	FASAF		
2.	Mentor Zeqiri			
3.	Tatjana Mitkova	FASAF		
4.	Kristina Sotirovska	UKIM		
5.	Nikolche Velkovski	FOF		
6.	Pece Stojkovski	NEA		
7.	Ivana Ilievska	UKIM/FDT		
8.	Sasa Mangovski	FASF		

4. Workshop Agenda

Agenda Item	Duration (min)	Description
Introduction	5	Welcome remarks; objective of the workshop
AHP result presentation	10	Key priority rankings; interpretation of results for the institution
Presentation of Draft Action Plan	30	Selected priorities with reasons; proposed actions using the implementation template
Discussion & Validation	30	Feedback from stakeholders; alignment with institutional strategy; identification of gaps or adjustments
Finalisation Steps	15	Agreement on revisions; next steps and responsibilities

5. Presentation of AHP Prioritisation Results

The AHP results report prepared for FASF/UKIM was presented in full to participants at the start of the workshop, covering the criteria weights, the ranking of all 21 alternatives, and the strategic interpretation of the results. FASF/UKIM submitted 13 responses to the AHP survey; judgments were aggregated using the geometric mean method, and all consistency ratios were within the acceptable threshold, confirming the reliability of the results for institutional strategic planning.

6. Presentation of Draft Action Plan

Based on the AHP prioritisation results, the five highest-ranked actions were selected to form FASF's draft Bioeconomy Research Action Plan and were presented to participants together with the reasoning for their selection.

7. Action Plan – Implementation Framework

The implementation framework for each of the five selected priorities was presented using the BEAMING institutional action plan template.

8. Discussion and Validation Results

The validation session was organised with the above-mentioned participants. Participants reviewed the five selected actions against the

validation criteria defined in the BEAMING workshop guideline and provided recommendations for their implementation and long-term sustainability. These recommendations are reflected below and will be incorporated into the final action plan document.

8.1 Alignment with Institutional Strategies and Priorities

Feedback

Participants agreed that the five selected actions are strongly aligned with FASF's ambition, articulated during the institutional Expert Workshop to become the national INNO-AGRI Hub for sustainable agriculture, digital agriculture and bioeconomy, as well as with UKIM's broader research and internationalisation strategy and with EU Green Deal and Farm to Fork policy directions.

Particular emphasis was placed on the complementary nature of the environmental-assessment action (A8) and the green-lab action (A10), which together reinforce the Experimental Field's aspirational role as a regional example of sustainable resource management, and on the circular-economy actions (A5, A6), which strengthen FASF's Quadruple Helix cooperation with industry, municipalities and government.

8.2 Feasibility of Implementation

Feedback

Participants considered the proposed actions largely feasible given FASF's existing Experimental Field infrastructure, accredited laboratories and experienced research staff.

It was noted, consistent with weaknesses identified during the Expert Workshop, that limited pilot-scale infrastructure and the existing administrative burden on research staff could slow implementation of new mechanisms such as the seed-funding scheme (A21) and the partnership-formalisation process (A6).

The LCA/carbon-footprinting and green-lab actions (A8, A10) were seen as feasible provided they are introduced gradually and supported by targeted training.

Recommendations

- Phase implementation, starting at pilot/demonstration scale before scaling up;

- Embed new mechanisms within existing institutional structures rather than creating new administrative units;
- Align the seed-funding/mobility action with existing Horizon Europe, Erasmus+ and national calls to reduce administrative burden.

8.3 Availability of Resources and Capacities

Feedback

Participants agreed that FASF possesses strong scientific and technical expertise, an accredited Experimental Field, and established participation in EU-funded and international projects.

Consistent with the Expert Workshop findings, participants flagged limited pilot-scale infrastructure for innovation scaling, dependence on external project funding, and a limited number of early-career researchers as the main capacity constraints for the selected actions.

Recommendations

- Actively pursue Horizon Europe, Erasmus+ and national funding to co-finance pilot infrastructure and mobility grants;
- Leverage FASF's membership in CASEE and ICA networks for expertise-sharing and co-funded activities.

8.4 Potential Institutional Impact

Feedback

Participants identified substantial expected benefits, including: stronger positioning of FASF as the national INNO-AGRI hub; enhanced credibility for Horizon Europe climate-related funding through standardised LCA/carbon-footprint evidence; strengthened Quadruple Helix cooperation through the circular-economy pilots; improved retention of early-career researchers; and an improved institutional sustainability profile.

Particular support was expressed for actions that connect FASF's research outputs to practical applications for industry, municipalities and policy (Ministry of Agriculture, Forestry and Water Economy).

8.5 Timeline

Feedback

Participants considered the proposed 6-24 month timelines realistic for actions 1-4, and appropriately cautious for the green-lab action (A10), which participants noted may require a longer, phased timeline given the age and infrastructure constraints of the FASF building.
It was recommended that implementation follow a phased approach across all five actions.

Recommendations

- Phase 1 (0-12 months): partner and stakeholder mapping, methodology adoption, capacity building, and launch of the seed-funding/mobility call;
- Phase 2 (12-24 months): pilot implementation (residue valorisation, circular partnerships), monitoring, and gradual roll-out of green-lab measures.

8.6 Sustainability of Proposed Actions

Feedback

Participants agreed that sustainability is one of the strongest aspects of the proposed action plans, as all five actions build on FASF's existing Experimental Field infrastructure, ongoing EU project participation, and the institution's strategic ambition to become the national INNO-AGRI Hub.
Long-term sustainability will be supported through continued development of the Experimental Field as a pilot and demonstration site; institutionalisation of LCA/environmental monitoring as standard research practice; formalised, durable partnerships with industry and municipalities; integration of the seed-funding scheme into regular career-development structures; and continued participation in Horizon.

9. Overall Validation Conclusion

The validation process confirmed that FASF's institutional action plan is well aligned with the objectives of the BEAMING project and with the strategic priorities of Ss. Cyril and Methodius University in Skopje. The selected priorities were assessed as relevant, feasible, and consistent with both institutional capacities and stakeholder expectations, while the combination of AHP prioritisation results and the institutional Expert

Workshop findings was considered to provide a balanced, evidence-based foundation for implementation planning.

Overall, the proposed action plan was recognised as suitable for strengthening FASF's capacities in environmental and climate-oriented bioeconomy research, circular resource management, and researcher career support. The workshop therefore concluded that the action plan is approved for finalisation, subject to the incorporation of the agreed revisions and adjustments listed in Section 9.

10. Workshop Outcome

The validation workshop resulted in the successful confirmation of FASF's institutional Bioeconomy Research Action Plan as a coherent and implementation-ready framework. The process ensured that the proposed actions are strategically relevant, operationally feasible, and aligned with institutional priorities and stakeholder expectations, including the institution's ambition to become the national INNO-AGRI Hub. As a result, the action plan was formally validated and endorsed for finalisation and subsequent implementation by FASF, Ss. Cyril and Methodius University in Skopje, following incorporation of the agreed revisions.

Bioeconomy Research Action Plan – UKIM

SELECTED PRIORITIES

Based on the AHP prioritisation results, the five highest-ranked actions were selected to form FASF's draft Bioeconomy research Action Plan and were presented to participants together with the reasoning for their selection:

Priority rank	Action Areas	Selection Reason
1	Integrate LCA, carbon footprinting, and soil health monitoring into bioeconomy research projects	Directly reflects the highest-weighted criterion (Environmental and climate contribution, C3) and builds on the Experimental Field's role as a sustainability demonstration site.
2	Partner with local industries or municipalities to co-develop circular bio-based pilot solutions	Reflects the second-highest criterion (Sustainable biomass use and circularity, C2) and strengthens Quadruple Helix cooperation identified in the Expert Workshop.

3	Develop a pilot system for nutrient recycling and residue valorisation	Also reflects C2; provides a practical, applied complement to the partnership-based circular action.
4	Provide internal seed funding or mobility grants for early-career led pilot research and international networking	Very high local priority within Researcher career support (C7); directly addresses the brain-drain risk identified in the Expert Workshop SWOT analysis.
5	Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices	Further reinforces C3 and complements Action 1 by embedding sustainability into day-to-day laboratory operations.

RECOMMENDED ACTIONS

The implementation framework for each of the five selected priorities was presented using the BEAMING institutional action plan template, as follows:

Priority 1: Integrate LCA, carbon footprinting,and soil health monitoring into all major bioeconomy research projects to quantify Environmental performance (A8)

Priority Rank	1 (AHP global priority 9.92%)
Action Area	Integrate LCA, carbon footprinting, and soil health monitoring into all major bioeconomy research projects to quantify environmental performance (A8)
Objective	To systematically integrate life-cycle assessment (LCA), carbon footprinting and soil health monitoring into FASF's bioeconomy research portfolio, positioning the Experimental Field as a regional reference site for climate-smart, sustainability-assessed agricultural research.
Description of Action	Establish standardised environmental assessment protocols (LCA, carbon footprint, soil health indicators) to be applied across ongoing and future bioeconomy research projects, building on the Experimental Field and laboratory infrastructure.
Actions	• Review and adopt internationally recognised LCA/carbon-footprinting methodologies suitable for agri-food research • Establish a soil health monitoring protocol at the Experimental Field • Train researchers in LCA and carbon-footprint tools • Integrate sustainability indicators into project proposal templates and reporting • Pilot the methodology on 2-3 ongoing bioeconomy projects
Responsible Unit / Person	FASF Research Office / Experimental Field management / project leaders of bioeconomy-related projects
Timeline	Short- to medium-term (6-18 months)
Required Resources	• Technical expertise in LCA and carbon accounting

	• Laboratory capacity for soil analysis • Software/licensing costs • Training budget
Expected Outputs	• Adopted institutional LCA/carbon-footprint protocol • Soil health monitoring baseline established at the Experimental Field • Trained research staff
Expected Outcomes	• Increased scientific credibility and comparability of FASF's environmental research • Stronger alignment with EU Green Deal and Farm to Fork requirements • Enhanced ability to attract Horizon Europe climate-related funding
Monitoring Indicators	• At least 3 bioeconomy projects applying the LCA/carbon-footprint methodology within 18 months • Soil health monitoring dataset established for the Experimental Field • At least 10 researchers trained
Potential Risks / Challenges	• Limited in-house expertise in LCA methodology • Additional workload for already-burdened research staff • Cost of specialised equipment and software
Mitigation Measures	• Partner with international LCA expertise through existing networks (Horizon Europe, CASEE, ICA) • Integrate training into existing capacity-building activities • Seek co-funding through EU projects for equipment and software

Priority 2: Partner with local industries or municipalities to co-develop circular bio-based pilot solutions (A6)

Priority Rank	2 (AHP global priority 7.95%)
Action Area	Partner with local industries or municipalities to co-develop circular bio-based pilot solutions (A6)
Objective	To establish structured partnerships between FASF, agri-food industry actors and municipalities to co-develop and test circular bio-based pilot solutions using local agricultural residues and by-products.
Description of Action	Identify and formalise cooperation with agri-food companies, producers and municipalities to co-design circular bioeconomy pilots (residue valorisation, by-product reuse), using the Experimental Field as a demonstration platform.
Actions	• Map existing and potential industry and municipal partners active in circular bioeconomy • Organise matchmaking events / stakeholder forums bringing together industry, municipalities and researchers • Define 2-3 priority pilot themes (e.g. agricultural residue valorisation, food by-products)

	• Develop cooperation agreements or memoranda of understanding • Launch pilot activities at the Experimental Field
Responsible Unit / Person	FASF management / International Relations and Project Office / Experimental Field
Timeline	Short- to medium-term (6-18 months)
Required Resources	• Funding for pilot implementation • Staff time for partnership development • Communication and dissemination support
Expected Outputs	• Signed cooperation agreements with at least 2 industry/municipal partners • At least one operational circular-bioeconomy pilot
Expected Outcomes	• Strengthened Quadruple Helix cooperation • Practical validation of circular bioeconomy solutions • Increased visibility of FASF as an applied-research partner for industry and local government
Monitoring Indicators	• At least 2 partnership agreements signed • At least 1 pilot solution implemented • At least 15 stakeholders engaged through matchmaking activities
Potential Risks / Challenges	• Limited pilot-scale infrastructure for innovation scaling • Dependence on external project funding • Differing priorities between academic and industry partners
Mitigation Measures	• Use the Experimental Field as a low-cost demonstration platform • Pursue co-funding through Horizon Europe and regional programmes • Define clear roles and expectations in partnership agreements

Priority 3: Develop a pilot system for nutrient recycling and residue valorisation (A5)

Priority Rank	3 (AHP global priority 7.35%)
Action Area	Develop a pilot system for nutrient recycling and residue valorisation (A5)
Objective	To design and test an institutional pilot system for nutrient recycling and valorisation of agricultural residues generated at the Experimental Field and partner farms, supporting circular bioeconomy practice.
Description of Action	Develop and trial a nutrient-recycling / residue-valorisation pilot (e.g. composting, bio-based fertiliser production, residue-to-resource conversion) at the Experimental Field, linked to ongoing sustainable agriculture research.
Actions	• Assess the types and volumes of residues generated at the Experimental Field and partner farms • Design the pilot nutrient-recycling/valorisation system

	• Test the pilot under real production conditions • Monitor environmental and economic performance • Document and disseminate results to stakeholders
Responsible Unit / Person	Experimental Field management / researchers in agricultural economics and environmental sciences
Timeline	Medium-term (12-18 months)
Required Resources	• Investment in pilot equipment/infrastructure • Technical expertise in nutrient management • Monitoring and analytical capacity
Expected Outputs	• Operational nutrient-recycling / residue-valorisation pilot • Technical documentation of results
Expected Outcomes	• Reduced waste and input costs • Demonstrable circular-bioeconomy model for regional dissemination • Strengthened evidence base for policy advice to the Ministry of Agriculture, Forestry and Water Economy
Monitoring Indicators	• 1 pilot system operational within 18 months • Quantified reduction in residue waste / nutrient input • At least 1 dissemination event or publication
Potential Risks / Challenges	• Investment cost for pilot infrastructure • Dependence on external funding • Technical uncertainties in scaling from experimental to practical conditions
Mitigation Measures	• Seek co-financing through national and EU calls • Start with a small-scale pilot before scaling • Involve industry partners early to align with practical needs

Priority 4: Provide internal seed funding or mobility grants for early-career led pilot research and international networking (A21)

Priority Rank	4 (AHP global priority 6.57%)
Action Area	Provide internal seed funding or mobility grants for early-career led pilot research and international networking (A21)
Objective	To strengthen retention and career development of early-career researchers at FASF by providing seed funding and mobility support for pilot research and international networking, addressing the institution's brain-drain risk.
Description of Action	Establish a mechanism providing small seed grants and mobility funding to early-career researchers and PhD students to lead pilot bioeconomy research and participate in international networking (Erasmus+, Horizon Europe mobility, CASEE, ICA).
Actions	• Define eligibility criteria and application procedure for seed/mobility grants

	• Identify funding sources (institutional budget, University-level schemes, international programmes) • Launch a call for proposals among early-career researchers and PhD students • Provide mentoring and proposal-writing support • Monitor the outputs of funded pilot activities and mobility exchanges
Responsible Unit / Person	FASF management / International Relations and Project Office / senior researchers acting as mentors
Timeline	Short- to medium-term (6-18 months)
Required Resources	• Dedicated institutional budget line • Mentoring capacity • Administrative support for grant management
Expected Outputs	• Established internal seed-funding/mobility scheme • Number of early-career researchers funded
Expected Outcomes	• Improved retention of young researchers • Stronger participation in international networks (Horizon Europe, Erasmus+, CASEE, ICA) • Increased pilot research output
Monitoring Indicators	• At least 3-5 early-career researchers/PhD students supported annually • At least 2 mobility exchanges completed • Increased proposal-submission rate by early-career staff
Potential Risks / Challenges	• Limited institutional budget for a standalone funding scheme • Uncertainty regarding long-term retention of trained researchers • Administrative burden of managing a new scheme
Mitigation Measures	• Align the scheme with existing University, national and Horizon Europe/Erasmus+ mobility calls rather than a fully new budget line • Embed mentoring within existing structures • Link grants to career-development and retention commitments

Priority 5: Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (A10)

Priority Rank	5 (AHP global priority 6.33%)
Action Area	Introduce green lab standards including energy efficiency, sustainable materials, and waste reduction practices (A10)
Objective	To reduce the environmental footprint of FASF's laboratories and research operations by introducing green-lab standards covering energy efficiency, sustainable materials use, and waste reduction.
Description of Action	Develop and implement institutional green-lab guidelines applicable to FASF's laboratories and Experimental Field facilities, adapted to the constraints of the existing building infrastructure.

Actions	• Conduct an audit of current energy use, materials and waste practices in FASF laboratories • Develop green-lab guidelines (energy efficiency, sustainable procurement, waste segregation/reduction) • Pilot the guidelines in selected laboratories • Provide staff training and awareness-raising • Monitor and report on adoption progress
Responsible Unit / Person	FASF laboratory management / Experimental Field / Research Office
Timeline	Medium- to long-term (12-24 months), phased implementation
Required Resources	• Budget for equipment upgrades • Staff time for guideline development and training • Possible minor infrastructure investment
Expected Outputs	• Adopted green-lab guidelines • Pilot laboratories implementing green practices
Expected Outcomes	• Reduced energy consumption and waste generation • Improved institutional sustainability profile • Alignment with EU Green Deal principles
Monitoring Indicators	• Green-lab guidelines adopted • At least 2 pilot laboratories implementing measures • Measurable reduction in energy/waste indicators
Potential Risks / Challenges	• Infrastructure and budget limitations for full modernisation • Competing priorities for limited resources
Mitigation Measures	• Adopt phased, low-cost measures first (waste segregation, energy awareness) • Seek EU/national funding for infrastructure upgrades • Integrate into broader University sustainability initiatives

UNIBL Validation Workshop Report and Action Plans

The Bioeconomy research action plan directly contributes to the BEAMING objective of facilitating knowledge exchange and cross-border collaboration in the bioeconomy by translating institutional priorities into concrete research, innovation and cooperation actions. Document defines the strategy to transition the UNIBL from localized, ad hoc activities to an institutionalized bioeconomy research roadmap. On February 12, 2026, UNIBL gathered 14 Quadruple Helix experts (Academia, Industry, Government, Civil Society) at the Rectorate Building for a structured workshop to establish baselines and align objectives with the broader framework. Participants conducted a SWOT/TOWS analysis that identified internal risks like regional "brain drain" and administrative complexity, while mapping pathways to capture expanding EU funding for the Western Balkans. To bridge these high-level opportunities with execution reality, an internal resource-readiness evaluation was conducted utilizing the Analytic Hierarchy Process (AHP).

To ensure institutional alignment and quality control, a validation workshop was held on June 26, 2026. This session brought together key internal stakeholders, including the Vice-Rector for Scientific Research and University Development, Vice-Deans for Scientific Research, and the administrative staff responsible for research management and support activities. During the workshop, participants officially confirmed the draft and provided valuable recommendations for improvement, ensuring that the finalized Action Plan is fully aligned with the University's overarching strategic documents and long-term development goals.

This roadmap serves as the primary project controls document, focusing immediate resources on five top-tier priorities to scale innovation, optimize technology transfer, and build regional sustainability leadership.



Bioeconomy Research Action Plan – UNIBL

SELECTED PRIORITIES

Priority rank	Action Areas	Selection Reason
1	Establish entrepreneurial support programs	Strongly reflects the economic impact and competitiveness criterion, focusing on building future capacity and university mentoring for startups.
2	Launch of joint pilot projects with regional bio-based industries	Strongly reflects the top-ranked criterion, Innovation and investment scale-up, emphasizing real-world pilot implementation.
3	Develop an internal system for technology transfer and commercialisation of innovations	Addresses critical institutional needs to build effective innovation systems and translate research into economic value.
4	Establish cross-border collaboration and matchmaking events	Acts as a key enabler for interdisciplinary collaboration and bridges the gap between research and business stakeholders

	between HEIs, industry, public institutions and civil society in the field of bioeconomy	
5	Establish institutional monitoring of biodiversity or ecosystem services linked to research activities	Drives UNIBL's environmental and climate contribution (C3), ensuring environmental responsibility is deeply integrated into research agendas.

RECOMMENDED ACTIONS

Field	Description
Priority Rank	1
Action Area	Establish entrepreneurial support programs
Objective	To foster bioeconomy entrepreneurship, support staff and student-led bio-based ventures, increase research valorisation, and create institutional mechanisms that help retain talent and reduce brain drain.
Description of Action	Launch internal entrepreneurship initiatives and incubation services targeting the bioeconomy sector
Actions	1. Design structured entrepreneurship training modules. 2. Set up startup mentoring schemes connecting university researchers with business mentors. 3. Involve Master's and PhD students in entrepreneurship challenges. 4. Creating administrative and operational prerequisites for establishing spin-off organizations
Responsible Unit / Person	Centre for Development and Research Support / Student Unions / Faculties
Timeline	Short to medium-term (0–18 months)
Required Resources	Experienced business mentors and dedicated coordination staff.
Expected Outputs	Mentorship programs established; dedicated bioeconomy startup incubation framework.
Expected Outcomes	Increased student motivation for research, practical creation of spin-offs, and commercialized research outputs
Monitoring Indicators	number of business ideas pre-incubated; number of teams receiving mentoring; number of spin-off concepts developed; number of follow-up funding or incubation applications submitted
Potential Risks / Challenges	Low initial student motivation

Mitigation Measures	Leverage internal research excellence rewards and active outreach across faculties.

Field	Description
Priority Rank	2
Action Area	Launch of joint pilot projects with regional bio-based industries
Objective	To strengthen practical innovation, applied research, and joint academic-business ventures.
Description of Action	Partner with regional stakeholders, bio-based companies, HEIs and research organisations to launch collaborative pilot initiatives
Actions	1. Map existing research capacity and match it with local bio-based industry needs. 2. Form interdisciplinary research teams across relevant faculties. 3. Apply for joint regional or EU funding initiatives to scale up pilots
Responsible Unit / Person	Faculties and Institutes (Agriculture, Forestry, Technology and all other related to bioeconomy) / Centre for Development and Research Support
Timeline	Medium-term (12–24 months)
Required Resources	Access to existing laboratory infrastructure, co-financing resources, and industry contributions.
Expected Outputs	Joint pilot project agreements signed; collaborative applied research activities launched.
Expected Outcomes	Stronger regional industry engagement, technology validation in real-world scenarios, and enhanced innovation capacity.
Monitoring Indicators	Number of joint pilot projects launched; number of private-public partnerships formalized.
Potential Risks / Challenges	unstable local public R&I funding
Mitigation Measures	Utilize existing EU networks (Horizon Europe, Interreg and other) to secure external international funding

Field	Description
Priority Rank	3
Action Area	Develop an internal system for technology transfer and commercialisation of innovations
Objective	To streamline institutional mechanisms for patenting, spin-off creation, and commercializing bioeconomy solutions. This action represents a core institutional reform measure aimed at establishing

	predictable procedures for identifying, protecting, managing and commercialising research results
Description of Action	Institutionalize a clear commercialization pipeline to transfer research results from the lab directly to market applications.
Actions	1. Draft and adopt institutional guidelines for technology transfer and intellectual property rights. 2. Provide specialized training for research management staff on intellectual property management and commercialization. 3. Create a portal or repository showcasing patent-ready or commercializable technologies.
Responsible Unit / Person	University Office of Vice-Rector for Scientific Research and Development / Centre for Development and Research Support
Timeline	18-36 months
Required Resources	Legal expertise in IP protection, administrative support staff, and technology transfer toolkits
Expected Outputs	Finalized institutional technology transfer protocols; specialized training completed for support units.
Expected Outcomes	Systematic commercialization of research, translation of academic results into economic impact, and lower institutional risk.
Monitoring Indicators	Number of innovations screened for commercialization; number of patent filings or licenses issued.
Potential Risks / Challenges	Bureaucratic inefficiency and rigid internal administrative procedures.
Mitigation Measures	Secure high-level institutional buy-in early on and adapt administrative workflows to match international best practices.

Field	Description
Priority Rank	4
Action Area	Establish collaboration/matchmaking events between industry and academia in the field of bioeconomy
Objective	To reduce systemic information gaps, foster open dialogue, and create regular cross-border multi-stakeholder partnerships among HEIs, industry, government, civil society and innovation support organisations .
Description of Action	Organise dedicated industry–academia networking open days, and targeted matchmaking roundtables.
Actions	1. Organize "Open Days" at university faculties for regional businesses.

	2. Establish thematic dialogue events focused on regional bioeconomy challenges. 3. Build a database of industry actors willing to engage in practical educational modules.
Responsible Unit / Person	Centre for Development and Research Support / Faculties
Timeline	0–12 months
Required Resources	Communication tools, networking venue space, and event organizational support
Expected Outputs	Regular matchmaking and dialogue events executed; multi-helix contact network mapped
Expected Outcomes	Transition from ad hoc consulting interactions toward strategic, predictable, and long-term quadruple helix partnerships
Monitoring Indicators	Number of industry representatives participating; number of follow-up joint initiatives generated
Potential Risks / Challenges	Low initially perceived industry and academic interest or weak communication flows.
Mitigation Measures	Actively engage regional clusters, developing agencies and ministries to co-host and validate the relevance of the events

Field	Description
Priority Rank	5
Action Area	Establish institutional monitoring of biodiversity or other ecosystem services linked to research activities
Objective	To systematically assess environmental performance and ensure research tracks regional sustainability guidelines
Description of Action	Embed mandatory monitoring of biodiversity impact, carbon footprints, and environmental parameters into large-scale research initiatives
Actions	1. Establish operational guidelines for evaluating the ecosystem footprint of university projects. 2. Leverage field expertise at the Faculty of Forestry and Faculty of Agriculture to set baseline metrics. 3. Publish open-access data logs detailing the university's environmental performance indicators.
Responsible Unit / Person	Faculties and Institutes/Office of Vice-Rector for Scientific Research and Development
Timeline	12–30 months
Required Resources	Sustainability assessment toolsets, tracking software, and dedicated research monitors.

Expected Outputs	Institutional monitoring framework launched; open science environmental section of data repository created.
Expected Outcomes	Better alignment with international environmental priorities, open science integration, and transparent local ecosystem protection
Monitoring Indicators	Percentage of large bioeconomy projects with formal sustainability tracking; volume of open data published
Potential Risks / Challenges	Lack of unified tracking standards or fragmented sectoral tracking approaches
Mitigation Measures	Align all internal protocols directly with emerging European Union circular economy standards

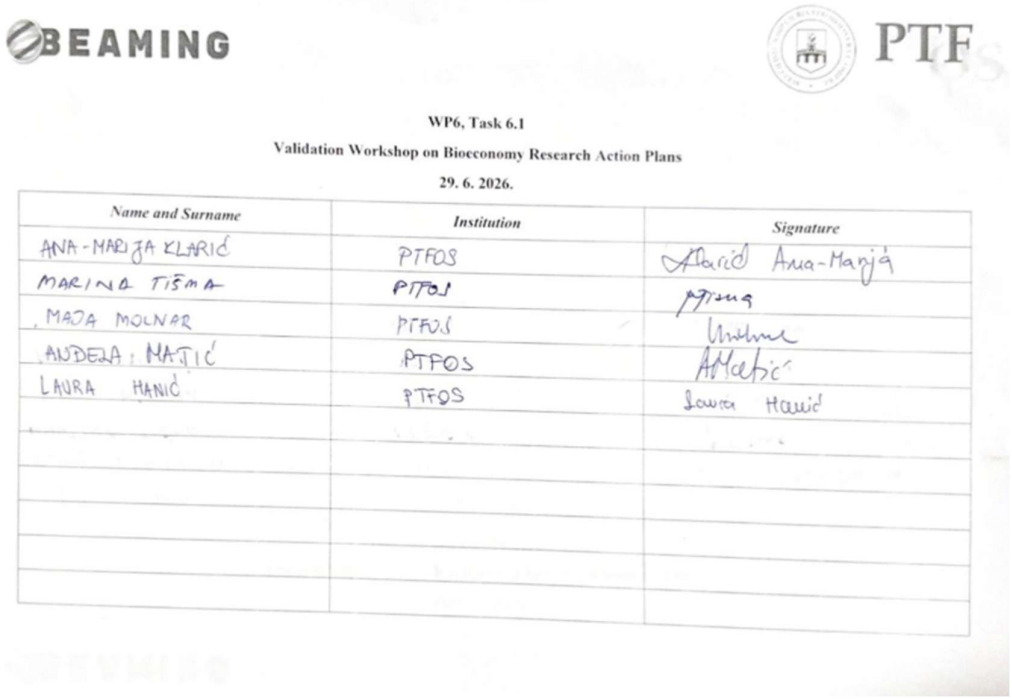
UNIOS Validation Workshop Report and Action Plans

Workshop Details:

Date: 29.6.0206.

Participants:

- Institutional decision makers: Vice-Dean for quality management
- Research representatives
- Action plan development team



WP6, Task 6.1

Validation Workshop on Bioeconomy Research Action Plans

29. 6. 2026.

Name and Surname	Institution	Signature
ANA-MARIJA KLARIĆ	PTFOS	Klarić Ana-Marija
MARINA TIŠMA	PTFOJ	
MAJA MOLNAR	PTFOS	
ANDELA MATIĆ	PTFOS	AMatić
LAURA HANIĆ	PTFOS	Laura Hanić



Workshop

As part of BEAMING Task 6.1, (WP 6- Bioeconomy research), Faculty of Food Technology Osijek (Unios) developed institutional action plans based on the results obtained from Analytic Hierarchy Process methodology. The prioritisation process identified the most relevant actions for strengthening the university's bioeconomy research capacity. A validation workshop was conducted as part of this task to review and validate the drafted Bioeconomy Research Action Plans before their finalisation and implementation. The workshop enabled institutional stakeholders to provide feedback, confirm the proposed priorities and actions, and ensure their feasibility and alignment with the institution's strategic objectives.

Workshop objectives:

- Present the AHP prioritisation results to institutional stakeholders;
- Present the draft institutional action plans developed based on the prioritised results;
- Validate the relevance, feasibility, and strategic alignment of the proposed actions;

- Collect recommendations and feedback from institutional decision makers;
- Identify necessary revisions or adjustments before finalisation;
- Strengthen institutional ownership and commitment toward implementation.

Workshop agenda

Agenda	Duration (minutes)	Description
Introduction	5	• Welcome remarks • Objective of the workshop
AHP result presentation	10	• Key priority rankings • Interpretation of results for the institution
Presentation of Draft Action Plan	30	• Selected priorities with reasons • Proposed actions using implementation template
Discussion & Validation	30	• Feedback from stakeholders • Alignment with institutional strategy • Identification of gaps or adjustments
Finalisation Steps	15	• Agreement on revisions • Next steps and responsibilities

The workshop included the presentation and discussion of the AHP prioritisation results, which identified the most important institutional actions for strengthening bioeconomy research capacity. The results served as the basis for drafting the institutional Bioeconomy Research Action Plan.

The AHP prioritisation results indicated that strengthening institutional research capacity should be the primary strategic focus, particularly through support for early-career researchers, education and skills development, and improved research management. Based on these priorities, the institutional Action Plans focused on three key areas: strengthening support for early-career researchers through seed funding and mobility opportunities, enhancing bioeconomy education by introducing new elective courses and integrating bioeconomy topics

into existing master's and doctoral programs, and improving the sustainability of research practices through the implementation of green laboratory standards and researcher training in project preparation and management.

During the preparation of the action plans, the draft included objectives, implementation activities, responsible units, timelines, required resources, expected outputs and outcomes, monitoring indicators and risks and mitigation measures. During drafting the action plans, particular attention was given to the Faculty of Food Technology and University of Osijek Strategic Development Priorities.

Discussion and Validation

During the discussion and validation session, participants assessed the proposed action plans based on the following aspects: alignment with institutional strategies and priorities; feasibility of implementation; availability of resources and capacities; potential institutional impact; timeline and implementation realism; risks and mitigation measures; and sustainability of proposed actions.

Feedback and recommendations

Alignment with institutional strategies and priorities

Participants agreed that the proposed Action Plans are well aligned with the Faculty's strategic priorities and the University's objectives for strengthening research and education in bioeconomy. However, they highlighted that some actions should better reflect the institutional context and existing governance framework, particularly regarding funding mechanisms and curriculum development.

Feasibility of implementation

Participants considered the proposed actions generally feasible after several modifications. For the seed funding action, they emphasised

that the Faculty does not have the capacity to establish its own internal funding scheme and should instead focus on supporting researchers in applying for University, national, and international funding programmes. Regarding curriculum development, participants noted that introducing entirely new study programmes is not currently feasible; therefore, the focus should be placed on developing elective courses and integrating bioeconomy topics into existing courses wherever curriculum regulations allow. Similar limitations were recognised for integrating bioeconomy challenges into existing master's and doctoral programmes.

Availability of resources and capacities

Participants recognised that the proposed actions can largely rely on existing academic expertise and institutional capacities. Nevertheless, implementation will depend on continued administrative support, staff engagement, and the availability of University and external funding opportunities. For the Green Lab initiative, participants acknowledged that the age and infrastructure of the Faculty building limit the implementation of some sustainability measures, although gradual improvements should be pursued where feasible.

Potential institutional impact

Participants agreed that the proposed actions have the potential to strengthen institutional research and educational capacity, improve support for early-career researchers, enhance bioeconomy education, and promote more sustainable research practices. Particular value was assigned to strengthening project development capacities through researcher training

Timeline and implementation realism

The proposed timeline was considered generally realistic; however, participants emphasised that implementation is strongly dependent on institutional and University-level procedures. Regarding seed funding, it

was noted that the Faculty is time-bound by the schedule of University funding calls, as one recent call for University-funded research projects had already passed. Similarly, curriculum-related activities depend on formal accreditation and revision cycles, which take place only periodically. Therefore, participants recommended a flexible and phased timeline, allowing the Faculty to prepare activities in advance and align implementation with the next available University funding calls and curriculum revision opportunities.

Risks and mitigation measures

Participants agreed that the identified risks adequately reflect the Faculty's current challenges. Additional emphasis was placed on the limited institutional autonomy regarding funding decisions, the complexity of curriculum modifications, and infrastructural constraints affecting laboratory modernisation. The proposed mitigation measures—such as relying on University funding schemes, gradual curriculum integration, continuous mentoring, and phased implementation of Green Lab practices—were considered appropriate and realistic.

Sustainability of proposed actions

Participants considered the proposed actions sustainable if they are embedded within existing institutional activities and continuously supported by the Faculty and the University. Particular consensus was reached regarding the long-term value of researcher training in project preparation and implementation, which was viewed as one of the most sustainable actions due to its immediate applicability and long-lasting benefits for research capacity development.

Agreed revisions or adjustments

The action related to seed funding was revised to reflect the Faculty's limited capacity to establish its own internal funding scheme. Instead, the action will focus on providing institutional support to early-career

researchers in applying for University, national, and international funding programmes, including the University programme for early-career researcher projects.

Curriculum-related actions were adjusted to reflect existing administrative limitations. Rather than proposing major curriculum changes or new study programmes, the focus will be placed on developing new elective bioeconomy courses where possible and integrating bioeconomy topics into existing courses.

The integration of bioeconomy challenges into master's and doctoral programmes was revised to follow a gradual approach, mainly through existing courses, thesis topics, research activities, and doctoral research where feasible.

The Green Lab action was adjusted to reflect infrastructural limitations related to the Faculty's older building. The implementation will therefore focus on gradual and realistic improvements, such as energy awareness, waste reduction, sustainable materials, and feasible laboratory practices. Additionally, the timeline for the Green Lab Standards action was extended, in agreement with participants, to allow more realistic implementation given the infrastructural limitations of the Faculty building and the need for a gradual introduction of feasible sustainability measures.

The timeline was revised to allow flexible and phased implementation, taking into account University funding call schedules and periodic curriculum accreditation/revision cycles.

The action on training for project writing and implementation was confirmed as highly feasible and strongly supported by participants, with no major revisions required.

POST WORKSHOP ACTIVITIES

The validation workshop confirmed the relevance of the proposed institutional Bioeconomy Research Action Plans and provided important

recommendations for their final refinement. Participants agreed that the final version of the Action Plan should incorporate the comments collected during the workshop, particularly those related to implementation feasibility, available institutional resources, timelines, and alignment with existing University procedures.

As a follow-up, the institutional Implementation Action Plan will be finalised and prepared for submission in accordance with the requirements of BEAMING Task 6.1.

In the next phase, the Faculty will initiate the preparation of implementation roadmaps for the selected priority actions, including the identification of responsible units, realistic timelines, required resources, and potential funding opportunities. Where relevant, preparation of funding applications will be aligned with University, national, and international funding calls.

The final validated Action Plan will therefore serve as a practical institutional framework for strengthening bioeconomy research capacity, supporting early-career researchers, enhancing bioeconomy education, improving sustainability practices, and developing project management competences within the institution.

Bioeconomy Research Action Plan - UNIOS

Based on the Unios Expert Workshop Report and the AHP Prioritisation Results, the most appropriate approach is to build the implementation plan around the five highest-ranked priorities of proposed action plans for UNIOS, while ensuring alignment with the SMART goals and strategic directions identified during the expert workshop. The selected priorities are A21, A18, A17, A10, and A20.

SELECTED PRIORITIES

Priority rank in AHP	Action Area	Selection Reason
1.	Internal seed funding or mobility grants for early-career led pilot research and international networking (A21)	Supporting pilot research and mobility activities strengthens institutional research capacity, improves international networking, increases competitiveness for external funding, and contributes to long-term development of bioeconomy research excellence.
2.	Launch and test pilot bioeconomy courses (A18)	This action was included because bioeconomy-related education is still developing and requires more interdisciplinary and practice-oriented learning opportunities. Pilot courses allow testing innovative teaching approaches, aligning educational content with labor market needs, and increasing student competencies in sustainability and bioeconomy.
3.	Integrate bioeconomy challenges into doctoral and MSc programs (A17)	To strengthen the connection between research, education, and real-world sustainability challenges. Integrating bioeconomy topics into postgraduate programs supports interdisciplinary thinking, increases research relevance, and prepares students for future scientific and professional challenges in sustainable development and circular bioeconomy.
4.	Green lab standards including energy efficiency, sustainable materials, and waste reduction practices (A10)	This action was selected due to the increasing importance of sustainable research infrastructure and environmentally responsible laboratory practices. Implementing green lab standards contributes to institutional sustainability goals, reduces environmental impact and operational costs, and promotes awareness of responsible resource management among researchers and students.

5.	Training for writing and implementing projects (A20)	This action was prioritised because successful participation in national and international funding programs requires specialised knowledge and practical experience in project development and management. Training activities strengthen institutional capacity for obtaining external funding, improve project implementation quality, and support international collaboration within bioeconomy research and innovation activities.

Field	Description
Priority Rank	1. (Highest priority according to AHP results)
Action Area	Internal seed funding or mobility grants for early-career led pilot research and international networking
Objective	Strengthen the institution's research capacity by providing systematic support to early-career researchers in the preparation and implementation of research projects, with particular emphasis on the field of bioeconomy.
Description of Action	Strengthen institutional support mechanisms that enable early-career researchers to access seed funding and mobility opportunities through programs offered by the Josip Juraj Strossmayer University of Osijek, as well as national and international funding schemes. The action aims to encourage independent research, foster international collaboration, and support the development of competitive research projects. While support will be available for projects across various scientific disciplines, particular emphasis will be placed on research in the field of bioeconomy.
Actions	• Regularly inform researchers about available seed funding and mobility programs provided by the Josip Juraj Strossmayer University of Osijek • Encourage applications to the University program for funding research projects led by early-career researchers • Promote applications to other national and international funding programs for research projects led by early-career researchers • Foster interdisciplinary and international research collaboration • Provide institutional mentoring and administrative support during proposal preparation

	• Organise internal information workshops on funding opportunities and project idea development. • Support participation in international mobility programs and short research visits, networking events, workshops, summer schools, conferences • Monitor the utilisation of available funding programs and identify future funding needs to be communicated to the University within the framework of program agreements
Responsible Unit / Person	Faculty Management; Vice Dean for Science and International Cooperation; Project Management Office
Timeline	24 months
Required Resources	Institutional staff and administrative support, mentoring by experienced researchers, training and dissemination activities, collaboration with international partner institutions, funding for mobility and pilot research available through University programs and other national and international funding schemes
Expected Outputs	Increased number of applications submitted to University seed funding programs, increased number of mobility grants awarded, greater participation in international conferences and workshops, new research collaborations established, initiation of pilot research projects at the Faculty and/or in collaboration with external partners, preliminary research data generated to support applications for larger national and international research projects
Expected Outcomes	Strengthened research capacity of early-career researchers, increased research capacity in bioeconomy, enhanced institutional research capacity, improved international visibility and research excellence of the institution in the field of bioeconomy, higher number of collaborative research proposals, increased publication output and project competitiveness, enhanced career development of early-career researchers
Monitoring Indicators	Number of applications submitted to University funding calls, number of national and international project proposals submitted, number of funded early-career research projects, number of researchers participating in mobility programs, number of international collaborations initiated, number of scientific publications and conference presentations resulting from funded activities
Potential Risks / Challenges	Limited financial resources, administrative burden, insufficient number of international partnerships, insufficient participation of early-career researchers in available funding programs.
Mitigation Measures	Regularly inform early-career researchers about available national and international funding opportunities, establish partnerships with foreign institutions, provide proposal-writing support and mentoring,

	encourage the active involvement of early-career researchers in research and project activities

Field	Description
Priority Rank	2./3. (Second and third ranked priority according to AHP results)
Action Area	Launch and test pilot bioeconomy courses / Integrate bioeconomy challenges into doctoral and master's study Programs (Enhancing study programs through the integration of bioeconomy content and the development of new educational activities)
Objective	Enhance the quality of education and research by integrating bioeconomy-related content into existing study programs and developing new educational activities aligned with current research and sustainability challenges.
Description of Action	Enhance existing undergraduate, master's and doctoral study programs by integrating bioeconomy-related content and developing new educational activities and courses that provide students with interdisciplinary knowledge, practical competences, and research skills relevant to the field of bioeconomy.
Actions	• Review existing study programmes and identify opportunities for integrating bioeconomy-related content • Identify priority topics within the Faculty's research areas and the expertise of academic staff related to bioeconomy • Develop and introduce new bioeconomy courses (3–5 courses) as elective courses within the existing undergraduate and master's curricula • Develop course syllabi and intended learning outcomes • Integrate bioeconomy challenges, circular economy principles, sustainability, and innovation into existing courses where appropriate • Develop research topics related to bioeconomy for master's and doctoral theses and promote interdisciplinary research approaches • Encourage the participation of master's and doctoral students in research and project activities related to bioeconomy • Collect feedback from students, doctoral candidates, and academic staff, and continuously review and improve course content based on evaluation results
Responsible Unit / Person	Faculty Management; Vice Dean for Teaching and Science; Quality Assurance Office; Academic Staff
Timeline	24 months

Required Resources	Academic staff, teaching materials, institutional and administrative support for the development of new courses, laboratory and digital resources, funding for course development
Expected Outputs	Revised study programs, development of new bioeconomy courses, increased student enrolment in bioeconomy-related courses, integration of bioeconomy topics into existing courses and research activities, development of new teaching materials and learning resources, new master's and doctoral thesis topics related to bioeconomy, evaluation reports and collected feedback
Expected Outcomes	Improved knowledge and competences in bioeconomy, increased opportunities for interdisciplinary learning, stronger integration of education and research, enhanced employability and innovation skills of students, increased institutional visibility in bioeconomy education
Monitoring Indicators	Number of newly developed and implemented courses, number of courses integrating bioeconomy-related content, number of students enrolled in new courses, student participation and course completion rates, satisfaction of students, doctoral candidates, and academic staff, number of master's and doctoral theses related to bioeconomy
Potential Risks / Challenges	Limited teaching capacity, administrative requirements related to curriculum modifications, insufficient student interest, limited interdisciplinary coordination, limited practical resources sustainability of newly developed courses after the pilot phase.
Mitigation Measures	Promote courses through institutional channels, involve industry and external experts, provide staff training and support, integrate flexible and digital learning methods, seek external educational funding opportunities

Field	Description
Priority Rank	4. (Fourth ranked priority according to AHP results)
Action Area	Green Lab Standards Including Energy Efficiency, Sustainable Materials, and Waste Reduction Practices
Objective	Improve the environmental sustainability of research and teaching laboratories by implementing green lab standards focused on energy efficiency, sustainable resource use, and waste reduction practices.
Description of Action	Develop and implement institutional green laboratory guidelines that promote sustainable laboratory management, efficient energy and water use, responsible procurement, reduction of single-use materials, and improved waste management practices within bioeconomy-related research and educational activities.

Actions	• Assess current laboratory sustainability practices and resource consumption • Develop institutional green lab guidelines and sustainability criteria • Introduce energy-efficient laboratory equipment and practices • Promote sustainable procurement and reduction of single-use plastics and consumables • Implement waste segregation, recycling, and safe disposal procedures • Organise training and awareness workshops for staff and students • Establish monitoring and reporting mechanisms for laboratory sustainability performance
Responsible Unit / Person	Faculty Management; Laboratory Managers; Health, Safety and Environmental Office; Technical Support Services
Timeline	36 months
Required Resources	Institutional funding, sustainability experts, energy-efficient laboratory equipment, waste management infrastructure, educational materials, staff training resources
Expected Outputs	Developed green lab guidelines and protocols, number of laboratories implementing green practices, training sessions and awareness activities conducted, reduction in laboratory energy and material consumption, improved waste management procedures
Expected Outcomes	Reduced environmental impact of laboratory activities, increased awareness of sustainability practices among staff and students, improved resource efficiency and cost savings, enhanced institutional sustainability profile, contribution to institutional and national sustainability goals
Monitoring Indicators	Energy and water consumption levels, amount of laboratory waste generated and recycled, number of laboratories adopting green standards, participation in sustainability training activities, procurement of sustainable laboratory materials and equipment
Potential Risks / Challenges	Limited financial resources for equipment upgrades, resistance to behavioral changes, insufficient awareness of green lab practices, technical limitations in older laboratories
Mitigation Measures	Introduce implementation in phases, provide regular training and awareness campaigns, seek external sustainability funding, establish institutional incentives for green practices, promote sharing of best practices between laboratories

Field	Description
Priority Rank	5 (Fifth ranked priority according to AHP results)
Action Area	Provide training for writing and implementing projects
Objective	Strengthen institutional capacity for successful participation in national and international research and innovation funding programs through targeted training in project proposal development and project implementation.
Description of Action	Develop and implement a structured training programmed that supports researchers, academic staff, and early-career researchers in preparing competitive project proposals, managing funded projects, and improving project implementation skills within the field of bioeconomy.
Actions	• Identify training needs and priority funding programs • Organise workshops on project writing, budgeting, consortium building, and proposal evaluation • Provide training on project management, reporting, dissemination, and financial administration • Invite experienced coordinators and external experts to share best practices • Develop mentoring and peer-support mechanisms for proposal preparation • Create internal guidance materials and templates • Support networking activities for international partnership development
Responsible Unit / Person	Faculty Management; Project Management Office
Timeline	12-24 months
Required Resources	Institutional funding, internal and external trainers, educational materials and templates, digital learning platforms, administrative support, access to funding databases and project management tools
Expected Outputs	Organised training workshops and seminars, developed project-writing materials and guidelines, number of researchers trained, mentoring and support activities established, increased networking and consortium-building activities
Expected Outcomes	Improved quality of project proposals, increased success rate in national and international funding calls, enhanced project management and implementation capacity, stronger international collaboration and networking, increased research and innovation activity in bioeconomy
Monitoring Indicators	Number of training activities conducted, number of participants trained, number of submitted project proposals, success rate of

	funded proposals, participant satisfaction and feedback, number of international partnerships established
Potential Risks / Challenges	Limited staff availability, insufficient motivation for participation, lack of experience in international funding schemes, limited financial resources for continuous training
Mitigation Measures	Provide flexible and hybrid training formats, involve experienced project coordinators and external experts, promote institutional incentives for participation, seek external support through capacity-building programs, regularly update training materials according to funding trends

UNSFA Validation Workshop Report and Action Plans

Workshop Details:

Date: 15 June 2026

Participants: 12

Duration: 90 minutes

1. Background

As part of BEAMING Task T6.1, the University of Novi Sad, Faculty of Agriculture, developed draft Institutional Action Plans based on the outcomes of the Expert Workshop, SMART goals, and the Analytic Hierarchy Process (AHP) prioritisation exercise. The AHP methodology provided a transparent and evidence-based framework for identifying the most relevant and feasible actions to strengthen the institution's bioeconomy research and innovation capacity, while SMART goals reflected the priorities and expectations of Quadruple Helix stakeholders. To ensure that the proposed actions were both strategically relevant and realistically achievable, an validation workshop was organised in accordance with the BEAMING Guideline for Online Validation Workshops. The workshop brought together institutional decision-makers, academic staff, research and innovation representatives, and other relevant stakeholders to review, discuss, and validate the draft action plans. Participants assessed the proposed actions in terms of their strategic alignment, feasibility, expected impact, and implementation readiness, while considering both institutional priorities and broader bioeconomy ecosystem needs.

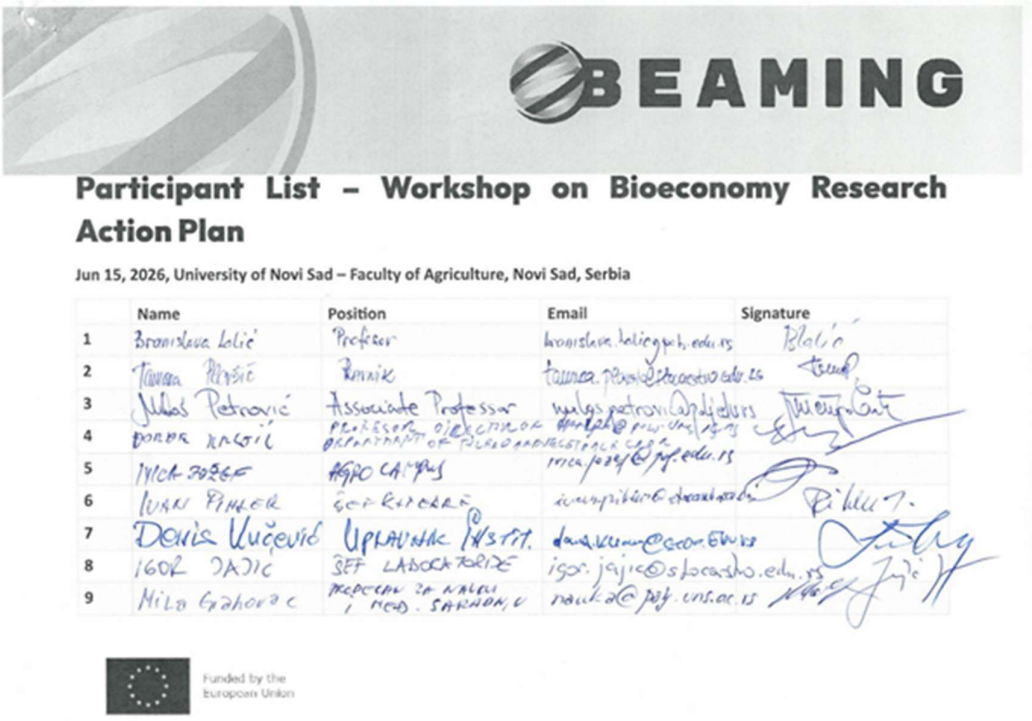
2. Objectives of the Workshop

The workshop pursued the following objectives:

- Present the results of the institutional AHP prioritisation exercise.

- Present the draft action plans developed from the prioritised actions.
- Validate the relevance, feasibility, and strategic alignment of the proposed actions.
- Collect recommendations and feedback from institutional decision-makers and stakeholders.
- Identify necessary revisions and implementation considerations.
- Strengthen institutional ownership and commitment towards implementation.

3. List of Participants

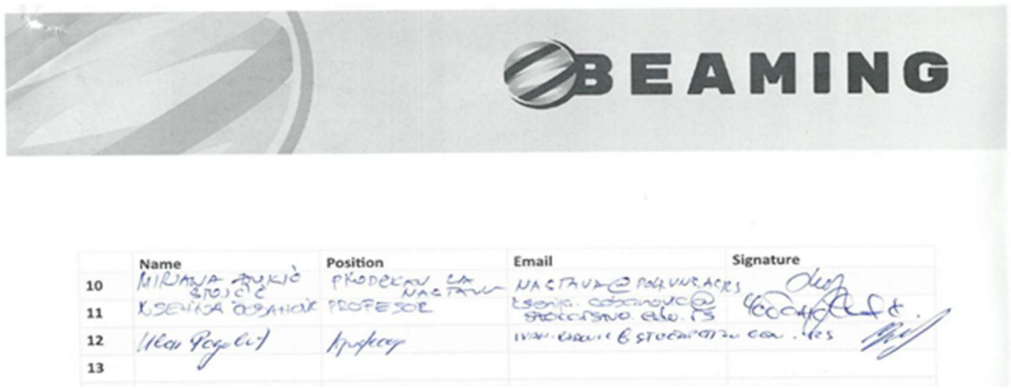


Participant List – Workshop on Bioeconomy Research Action Plan

Jun 15, 2026, University of Novi Sad – Faculty of Agriculture, Novi Sad, Serbia

	Name	Position	Email	Signature
1	Branislava Lalić	Profesor	branislava.lalic@pfn.edu.rs	
2	Tamara Miršić	Ravnik		
3	Jelena Petrović	Associate Professor		
4				
5				
6				
7	Dejan Vučević	Uplavnik Instit.		
8	IGOR JAJIĆ	ŠEF LABORATORIJE	igor.jajic@stocarstvo.edu.rs	
9				

Funded by the European Union



	Name	Position	Email	Signature
10	MIRJANA ŠTRKLJIĆ STOJIĆ	PRODEKAN ZA NASTAVU	NASTAVA@PAK.UNI.KG.AC.RS	
11	KSENIJA ĐORĐEVIĆ	PROFESOR	ksenija.djordjevic@stekom.edu.rs	
12	Ilija Popović	Profesor	ivan.ilic@stekom.edu.rs	
13				

4. Workshop Agenda

BEAMING

AGENDA

Radionice za pregled i validaciju akcionih planova

Agenda	Trajanje	Opis
Uvod	10	• Uvodno obraćanje • Cilj radionice
Prezentacija Akcionih Planova	30	• Odabrani akcioni planovi • Predložene aktivnosti akcionih planova
Diskusija & Validacija	30	• Povratne informacije učesnika • Usklađenost sa institucionalnom strategijom • Identifikacija nedostataka i potrebnih izmena
Zaključak	15	• Zaključna razmatranja i naredni koraci
Ručak		

5. Discussion and Validation Results

The validation session was organised with representatives of UNSFA management, Heads of Departments, researchers and research support services. Participants reviewed the three selected action plans against the validation criteria defined in the workshop guidelines and provided recommendations for their implementation and long-term sustainability. These recommendations are included in the final document.

5.1 Alignment with Institutional Strategies and Priorities

Feedback

Participants agreed that the selected action plans are strongly aligned with:

- The strategic development objectives of the Faculty of Agriculture, University of Novi Sad;
- The development priorities of the Agro Campus Research Center;
- European bioeconomy, circular economy, and Open Science policies;
- Institutional ambitions to strengthen cooperation with industry and increase the societal impact of research.

Particular emphasis was placed on the complementary nature of the three action plans, as they jointly address knowledge transfer, stakeholder engagement, innovation uptake, and research data management. Participants highlighted that the plans contribute

directly to strengthening the Faculty's role as a regional bioeconomy innovation hub.

Validation Outcome

✓ Fully validated

5.2 Feasibility of Implementation

Feedback

- Participants considered the proposed actions realistic and achievable within the planned implementation period.
- The establishment of partnerships with industry and municipalities was considered particularly feasible due to the existing cooperation network of the Faculty and the experimental capacities available through the Agro Campus Research Center.
- The FAIR data and biodiversity monitoring activities were recognised as achievable because they primarily build upon existing research capacities and expertise already present within the Faculty.
- For technology transfer activities, participants noted that successful implementation will depend on strengthening institutional procedures related to intellectual property management and commercialisation support.

Recommendations

- Gradually expand pilot activities through externally funded projects;

- Use existing Agro Campus infrastructure as a demonstration platform;
- Integrate technology transfer activities into ongoing research projects whenever possible.

Validation Outcome

✓ Validated with implementation recommendations.

5.3 Availability of Resources and Capacities

Feedback

Participants agreed that the Faculty possesses significant scientific expertise and infrastructure needed for implementation.

Existing capacities include:

- Research laboratories and experimental facilities;
- The Agro Campus Research Center;
- Strong expertise in agriculture, animal science, environmental monitoring, and data management;
- Experience in national and international project implementation.

However, additional resources may be required in the areas of:

- Intellectual property management;
- Commercialisation support;
- FAIR data implementation and repository management;
- Stakeholder engagement and project coordination.

Recommendation

Develop a targeted capacity-building programme focused on technology transfer, Open Science practices, and innovation

management, while actively pursuing Horizon Europe and other international funding opportunities.

Validation Outcome

✓ Validated with resource development recommendations

5.4 Potential Institutional Impact

Feedback

Participants identified substantial institutional benefits associated with implementation of the selected action plans.

Expected impacts include:

- Stronger collaboration between academia, industry, and public authorities;
- Increased visibility of Faculty research and innovation outputs;
- Improved utilisation of research results through commercialisation activities;
- Greater adoption of FAIR and Open Science principles;
- Increased competitiveness in European research and innovation programmes;
- Enhanced role of the Agro Campus Research Center as a regional innovation and demonstration platform.

Particular support was expressed for activities that connect research results with practical applications in agriculture and bioeconomy sectors.

Validation Outcome

✓ Strongly validated

5.5 Timeline and Implementation Realism

Feedback

Participants considered the proposed timelines (6–18 months for initial implementation phases) realistic and appropriately matched to available institutional capacities.

It was recommended that implementation should follow a phased approach:

Phase 1

- Partnership mapping and stakeholder engagement;
- FAIR data training activities;
- Development of technology transfer procedures.

Phase 2

- Pilot project implementation;
- Dataset publication and repository integration;
- Commercialisation support activities.
- Recommendations
- Establish annual implementation milestones;
- Conduct annual progress reviews;

Report implementation progress through existing institutional management structures.

Validation Outcome

✓ Validated with monitoring recommendations

5.6 Risks and Mitigation Measures

Feedback

Participants reviewed the identified risks and agreed that the proposed mitigation measures are appropriate.

Additional risks highlighted during the discussion included:

- Limited researcher engagement in data publishing activities;
- Insufficient awareness of intellectual property and commercialisation opportunities;
- Dependence on external project funding for pilot implementation;
- Administrative challenges related to multi-stakeholder cooperation.

Additional Mitigation Measures

- Introduce incentives for participation in Open Science and technology transfer activities;
- Strengthen internal communication regarding commercialisation opportunities;
- Develop long-term cooperation agreements with key industry partners;
- Integrate FAIR data and innovation management training into regular staff development programmes.

Validation Outcome

✓ Validated with additional risk mitigation recommendations

5.7 Sustainability of Proposed Actions

Feedback

Participants agreed that sustainability is one of the strongest aspects of the proposed action plans because the activities build upon existing institutional structures and strategic priorities.

Long-term sustainability will be supported through:

- Continued development of the Agro Campus Research Center;
- Integration of FAIR data practices into regular research workflows;
- Establishment of long-term partnerships with industry and municipalities;
- Incorporation of technology transfer and innovation support mechanisms into institutional procedures;
- Participation in national and European research and innovation programmes.

Participants stressed that the combination of stakeholder engagement, Open Science practices, and innovation commercialisation creates a mutually reinforcing framework that can continue beyond the duration of the BEAMING project.

Validation Outcome

✓ Strongly validated

6. Agreed Revisions and Adjustments

Following discussion, participants agreed on the following adjustments before finalisation. Enfasys said that next steps are important in building closer connection between UNSFA and AgroCampus experimental site and focus on innovation activities and closer cooperation with industry in transferring solutions. One of the examples are the activities related to the ongoing PROSUSTAIN project that is working on creation of novel feeding solutions based on sustainable protein sources from edible insects. AgroCampus supported project implementation and worked on creating a demo site for researchers, enthusiasts and industry to get familiar with the new innovation possibilities. This was underlined as a good practice to be maintained in the future. Currently, ClimaPannonia project is setting up a demo site in climate-neutral animal husbandry with prospects to work on a local solution for mixed farming systems to use farm waste and transfer it to energy for local use.

Participants further emphasized the need to develop a more structured approach to resource mobilisation, including the preparation of a funding strategy to support implementation activities. Strengthening cooperation with external stakeholders through regular engagement mechanisms was also highlighted as an important element for successful implementation.

It was also agreed that capacity-building activities should be further integrated into existing institutional training and development programmes.

7. Overall Validation Conclusion

The validation process confirmed that the institutional action plans are well aligned with the objectives of the BEAMING project and the strategic priorities of the University of Novi Sad, Faculty of Agriculture.

The selected priorities were assessed as relevant, feasible, and consistent with both institutional capacities and stakeholder expectations. The combination of AHP prioritisation results and SMART-based inputs was considered to provide a balanced foundation for implementation planning.

Overall, the proposed action plans were recognized as suitable for strengthening institutional capacities in bioeconomy research, innovation, knowledge transfer, and research data management. These elements were considered important for enhancing transparency, interoperability, and long-term usability of research outputs.

The workshop therefore concluded that the action plans are approved for finalisation, subject to the incorporation of the agreed revisions and adjustments.

8. Next Steps

Following the validation workshop, the institution will proceed with the finalisation of the action plans by integrating all agreed revisions into the final document.

In parallel, preparatory steps for implementation will be initiated, including the development of coordination arrangements, monitoring

mechanisms, and supporting implementation tools such as roadmaps and indicators.

UNSFA will work with AgroCampus to develop research and innovation strategies that will set pathways for future development of capacities and resources, including research work and active participation of researchers in the AgroCampus experimental site.

9. Workshop Outcome

The validation workshop resulted in the successful confirmation of the institutional action plans as a coherent and implementation-ready framework.

The process ensured that the proposed actions are strategically relevant, operationally feasible, and aligned with institutional priorities and stakeholder expectations, including emerging requirements related to Open Science and FAIR data practices.

As a result, the action plans were formally validated and endorsed for finalisation and subsequent implementation by the University of Novi Sad, Faculty of Agriculture, following the incorporation of agreed revisions.

10. Photos from the validation workshop







Bioeconomy Research Action Plan – UNSFA

SELECTED PRIORITIES

Priority rank in AHP	Action Area	Selection Reason
2	Partner with local industries or municipalities to co-develop circular bio-based pilot solutions.	Agro Campus Research Center is an experimental site with significant possibilities to implement bio-based pilot solutions, cooperate with industries, and engage with the municipality of Temerin
3	Establish institutional monitoring of biodiversity or ecosystem services linked to research activities	Boost knowledge of data management through biodiversity and other research diversities
4	Develop an internal system for technology transfer and commercialisation of innovations.	We will create stronger connections between UNSFA and Agro Campus Research Center to boost technology transfer and commercialisation of innovations.

RECOMMENDED ACTION PLANS

Field	Description
Priority Rank	2
Action Area	Partner with local industries or municipalities to co-develop circular bio-based pilot solutions.
Objective	To establish collaborative research and experimental pilots with agricultural food and feed industry actors and municipalities that valorize animal and crop-derived bio-waste into circular bio-based products
Description of Action	Identify and formalize partnerships with local livestock producers, food processors, and municipal waste managers to co-design and implement circular bio-based pilot projects using locally available agricultural residues and animal by-products
Actions	• Identify relevant industry and municipal partners • Organize stakeholder meetings and networking events • Define priority areas for collaboration • Develop cooperation agreements or memoranda of understanding • Initiate pilot activities and stakeholder engagement
Responsible Unit / Person	UNSFA departments / International Relations and Project Office / Agro Campus Research Center
Timeline	Short- to medium-term (6–18 months)

Required Resources	Funding for pilot activities and project coordination Human resources for partnership management Technical and scientific expertise Communication and dissemination support
Expected Outputs	Established partnerships with industries and municipalities Developed pilot bio-based solutions Joint project proposals and collaborative initiatives Workshops and stakeholder engagement activities
Expected Outcomes	Enhanced university-industry-municipal cooperation Promote practical application of bioeconomy research Improved sustainability and circular economy practices Greater access to external funding opportunities
Monitoring Indicators	Three partnership agreements established EUR 30 000 of external funding secured At least 12 stakeholders involved
Potential Risks / Challenges	Limited stakeholder engagement or commitment Insufficient financial support for pilot implementation Differences in priorities between partners
Mitigation Measures	Maintain regular communication and stakeholder involvement Align pilot activities with market needs Seek diversified funding opportunities Define clear roles, responsibilities, and expectations among partners

Field	Description
Priority Rank	3
Action Area	Establish institutional monitoring of biodiversity or ecosystem services linked to research activities
Objective	To improve institutional capacity for monitoring biodiversity and ecosystem services associated with research and innovation activities in support of sustainable bioeconomy development
Actions	Develop data collection procedures with FAIR data. Better use of collected data. Boost data publishing in open repositories.
Implementation Activities	• Organize training on FAIR data principles and their implementation in research activities • Provide training on machine learning approaches and the use of datasets for AI applications • Exchange knowledge on dataset publishing methodology • Create a list of open repositories relevant for different research disciplines
Responsible Unit / Person	UNSFA departments / International Relations and Project Office
Timeline	Short- to medium-term (12–18 months)
Required Resources	Technical expertise in datasets and FAIR data principles Data management expertise

Expected Outputs	Developed institutional guidelines for FAIR data management and publishing Organized training sessions and workshops on FAIR data and AI applications Increased number of datasets prepared according to FAIR principles Established list of recommended open repositories for different disciplines Published datasets in open-access repositories
Expected Outcomes	Improved quality, accessibility, and reusability of research data Increased institutional capacity for data-driven biodiversity and ecosystem monitoring Enhanced visibility and transparency of research activities Greater integration of open science practices into bioeconomy-related research Increased opportunities for interdisciplinary and international collaboration
Monitoring Indicators	At least 15 researchers trained in FAIR data management At least 2 datasets published in open repositories Availability of institutional guidelines and repository lists At least 2 collaborations involving shared datasets
Potential Risks / Challenges	Limited awareness and experience with FAIR data principles Low motivation for dataset publishing among researchers Concerns related to data ownership, privacy, or intellectual property Inconsistent data formats and metadata standards
Mitigation Measures	Provide continuous training and technical support on FAIR data implementation Develop guidelines and metadata standards for different research disciplines Encourage incentives for dataset publishing and open science practices Use reliable and internationally recognized repositories

Field	Description
Priority Rank	4
Action Area	Develop an internal system for technology transfer and commercialisation of innovations
Objective	To strengthen institutional capacity in animal science for transferring research results and innovations into practical applications, market opportunities, and industry collaboration
Description of Action	Participate in developing the institutional IP strategy. Develop commercialization activities at the Agro Campus Research Center. Promote industry collaboration based on research results
Actions	• Assess existing institutional capacities for technology transfer

	• Establish guidelines for intellectual property management • Create communication channels with industry and external stakeholders • Provide training on IP management • Support preparation of commercialization and partnership initiatives
Responsible Unit / Person	UNSFA departments / Agro Campus Research Center / International Relations and Project Office
Timeline	Short- to medium-term (12–18 months)
Required Resources	Increase knowledge of personnel for technology transfer support Legal and intellectual property expertise Operational budget for training and networking activities Communication and promotional resources
Expected Outputs	Developed IP strategy Defined procedures for commercialization support in Agro Campus Research Center Identified innovations with market potential Organize IP training
Expected Outcomes	Improved commercialization of research results Enhanced collaboration with industry and external partners Increased innovation visibility and institutional competitiveness Greater participation in innovation-driven projects and initiatives
Monitoring Indicators	At least 2 innovations assessed for commercialization At least 1 intellectual property or commercialization initiative supported Participation in training and networking activities
Potential Risks / Challenges	Limited institutional experience in commercialization activities Insufficient funding or specialized expertise Low engagement from researchers or industry partners Administrative and legal complexities
Mitigation Measures	Provide targeted training and capacity building Engage external experts Enhance internal support mechanisms Seek national and international funding opportunities

UP Validation Workshop Report and Action Plans

Workshop Details:

BACKGROUND

This document provides a structured framework for organizing online and on-site validation Workshops as part of BEAMING Task 6.1 at the Univeristy of Pannonia. The institutional validation workshop is conducted to review and validate the draft action plans developed based on the AHP prioritisation results and based on the Bioecnomoy Action Plan_University of Pannonia. The workshop aims to engage institutional decision makers and relevant stakeholders in assessing the relevance, feasibility, and strategic alignment of the proposed actions before finalisation and implementation.

Dates: 24th June; 10th July; 14th July.

OBJECTIVES

During the institutional online validation workshop we have:

- conducted a stakeholder validation workshop to present the AHP prioritisation results and the draft Bioeconomy Research Action Plans.
- Facilitated discussions to validate the relevance, feasibility, and strategic alignment of the proposed actions.
- Collected stakeholder feedback and recommendations to refine and improve the institutional Action Plans.
- Identified implementation challenges and agreed on the necessary revisions prior to final approval.
- Achieved institutional consensus and strengthened commitment towards the implementation of the prioritised bioeconomy actions.

PARTICIPANTS

- Institutional decision makers - Vice-Rector for innovation, Dean of Faculty of Engineering, Head of Technology Transfer Office.
- Researchers involved in bioeconomy related activities
- Relevant academic staff
- Action plan development team from the Faculty of Business Economics

WORKSHOP AGENDA

Agenda	Duration (minutes)	Description
Introduction	5	• Welcome remarks • Objective of the workshop
AHP result presentation	10	• Key priority rankings • Interpretation of results for the institution
Presentation of Draft Action Plan	30	• Selected priorities with reasons • Proposed actions using implementation template
Discussion & Validation	30	• Feedback from stakeholders • Alignment with institutional strategy • Identification of gaps or adjustments
Finalisation Steps	15	• Agreement on revisions • Next steps and responsibilities

VALIDATION PROCESS

During the discussion and validation session, participants were encouraged to assess the proposed action plans based on the following aspects:

- Alignment with institutional strategies and priorities;
- Feasibility of implementation;
- Availability of resources and capacities;
- Potential institutional impact;
- Timeline and implementation realism;
- Risks and mitigation measures;
- Sustainability of proposed actions.

Feedback regarding the priorities, plans and the planned mitigation measures:

Priority rank	Action Plan	Feedback from participants
1	A15 – Organize interdisciplinary workshops and seminars between industry and academia	Participants agreed that the University already organises a variety of meetings, workshops, and networking events. However, they emphasised that these activities are often discipline-specific and fragmented. More **thematic, interdisciplinary knowledge-sharing events** involving researchers, industry representatives, municipalities, and other stakeholders are needed to facilitate collaboration, generate joint research ideas, and strengthen the regional bioeconomy innovation ecosystem. Regular matchmaking events focusing on concrete research and innovation challenges were also recommended.
2	A19 – Establish career development programmes	This action generated the most extensive discussion. Several participants initially expressed concerns about the limited financial resources available for career development initiatives. Some questioned whether investing in early-career researchers is worthwhile, given the uncertainty of retaining them at the University after completing their training. Others argued that supporting young researchers is essential for maintaining institutional excellence and ensuring the long-term sustainability of bioeconomy research. Participants noted that the University is already developing a comprehensive career development framework and agreed that mentoring, proposal-writing support, international networking opportunities, and mobility schemes should become integral components of this programme.
3	A11 – Develop an internal system for technology transfer and commercialization of innovations	Participants acknowledged that the University already has a Technology Transfer Office (TTO), providing a solid institutional basis for this action. Nevertheless, they highlighted several limitations, including insufficient financial resources, limited staffing capacity, and the need for stronger support services in intellectual property management, business development, and industry engagement. It was suggested that the existing TTO should be

		strengthened rather than establishing a new structure, with greater emphasis on supporting researchers throughout the innovation and commercialisation process.
4	A6 – Partner with local industries or municipalities to co-develop circular bio-based pilot solutions	Participants recognised the importance of strengthening collaboration with local industries and municipalities but expressed concerns regarding the current policy and regulatory environment for the bioeconomy. Several stakeholders perceived that existing regulations, market incentives, and funding mechanisms do not sufficiently support the implementation and scaling-up of circular bio-based solutions. Despite these challenges, participants agreed that pilot projects remain essential for demonstrating the feasibility and benefits of innovative bioeconomy approaches. They also emphasised the need for stronger regional partnerships, increased stakeholder engagement, and closer cooperation with policymakers to create a more enabling environment for bioeconomy innovation

OUTPUTS

Priority rank	Feedback from participants	Recommendations / Mitigation Measures
1. A15 – Organize interdisciplinary workshops and seminars between industry and academia	Existing meetings are already organised, but more thematic knowledge-sharing events are needed.	• Develop an annual bioeconomy networking and knowledge-sharing calendar focusing on specific thematic challenges (e.g., circular bioeconomy, biomass valorisation, climate adaptation).• Combine workshops with matchmaking sessions to stimulate joint research proposals and innovation partnerships.• Involve industry representatives, municipalities, policymakers, and civil society to strengthen the Quadruple Helix approach.• Evaluate each event through participant feedback to continuously improve the programme.
2. A19 – Establish career development programmes	Financial constraints and uncertainty regarding the retention of young researchers.	• Integrate career development activities into existing institutional programmes to minimise additional costs.• Seek external funding (e.g.,

		Horizon Europe, MSCA, Erasmus+, national programmes) to support mentoring, mobility, and training activities.• Develop transparent career pathways, mentoring schemes, and proposal-writing support to increase researcher motivation and retention.• Promote a long-term institutional strategy recognising that investment in young researchers strengthens the University's research excellence, regardless of individual career trajectories.
3. A11 – Develop an internal system for technology transfer and commercialisation of innovations	The Technology Transfer Office exists but lacks sufficient staff and financial resources.	• Strengthen the existing Technology Transfer Office instead of creating parallel structures.• Provide specialised training for TTO staff in intellectual property management, business development, and Horizon Europe exploitation.• Increase collaboration between researchers, the TTO, and industrial partners from the early stages of research projects.• Explore external funding opportunities and regional innovation programmes to increase TTO capacity and services.
4. A6 – Partner with local industries or municipalities to co-develop circular bio-based pilot solutions	Stakeholders are pessimistic due to an unfavourable regulatory environment for bioeconomy implementation.	• Focus initially on small-scale demonstration projects that showcase technical feasibility and socio-economic benefits.• Strengthen dialogue with regional and national policymakers to communicate regulatory barriers and propose evidence-based improvements.• Build long-term partnerships with municipalities and industry to reduce implementation risks and increase commitment.• Actively participate in European bioeconomy networks to exchange good practices and identify policy and funding opportunities supporting circular bioeconomy initiatives.

Conclusion and endorsement of the Bioeconomy Research Action Plan

During the validation workshop, the proposed Bioeconomy Research Action Plan was presented and discussed in detail with researchers, early-career researchers, academic leaders, and professional staff. The participants acknowledged that the Action Plan reflects the priorities identified through the AHP analysis and provides a relevant and feasible strategic framework for strengthening the University's bioeconomy research and innovation capacity.

Following the discussions, a consensus was reached to endorse the Bioeconomy Research Action Plan as the institutional strategic framework, while recognising that its implementation should remain a dynamic and iterative process. The participants agreed that the Action Plan will be revised and further refined by incorporating the recommendations, comments, and practical suggestions collected during the workshop and through subsequent consultations with researchers, early-career researchers, administrative staff, and other colleagues involved in its implementation.

Furthermore, it was agreed that the Action Plan should be regularly monitored and updated to respond to emerging research priorities, funding opportunities, policy developments, and the evolving needs of the University and its external stakeholders. Continuous stakeholder engagement will ensure that the Action Plan remains relevant, practical, and aligned with the University's long-term research and innovation strategy.

The workshop participants expressed their commitment to supporting the implementation of the prioritised actions and emphasised that the successful delivery of the Action Plan will depend on sustained institutional leadership, interdisciplinary collaboration, adequate resource allocation, and active cooperation with industry, public authorities, and other members of the Quadruple Helix ecosystem. The validated Action Plan therefore represents not only a strategic roadmap for the University of Pannonia but also a shared institutional commitment to advancing excellence in bioeconomy research, innovation, knowledge transfer, and societal impact.

Bioeconomy Research Action Plan – UP

SELECTED PRIORITIES

Priority rank	Action Plan	Selection Reason
1	A15 – Organize interdisciplinary workshops and seminars between industry and academia	Highest AHP priority; strengthens interdisciplinary collaboration and knowledge exchange.
2	A19 – Establish career development programmes	Supports researcher career development and institutional capacity.
3	A11 – Develop an internal system for technology transfer and commercialization of innovations	Accelerates valorisation of research and innovation.
4	A6 – Partner with local industries or municipalities to co-develop circular bio-based pilot solutions	Strengthens circular bioeconomy implementation through external partnerships.

RECOMMENDED ACTIONS

Field 1	Description
Priority Rank	1
Action Plan	A15 – Organize interdisciplinary workshops and seminars between industry and academia
Objective	Strengthen interdisciplinary collaboration and knowledge exchange.
Description of Action	Create a recurring platform connecting researchers, industry, municipalities and policy actors.
Activities	Identify themes; organise workshops; facilitate matchmaking; develop project concepts; disseminate results.
Responsible Unit / Person	Vice-Rector for Research; Research Support Centre; Faculties
Timeline	2026–2028
Required Resources	Research staff, operational budget, stakeholder network.
Expected Outputs	6 workshops, stakeholder network, project ideas.
Expected Outcomes	Improved collaboration and increased Horizon Europe participation.
Monitoring Indicators	Number of workshops, participants, proposals.
Potential Risks / Challenges	Low stakeholder engagement.
Mitigation Measures	Early engagement of leadership and key departments Arranging informative discussions

Field 2	Description
Priority Rank	2
Action Plan	A19 – Establish career development programmes
Objective	Support career progression of bioeconomy researchers.
Description of Action	Develop mentoring, training and mobility schemes.
Activities	Mentoring; proposal training; mobility; career reviews.
Responsible Unit / Person	HR Office; Research Support Centre
Timeline	2026–2029
Required Resources	Training budget, mentors, mobility funds.
Expected Outputs	Career programme and mentoring network.
Expected Outcomes	Higher retention and proposal success.
Monitoring Indicators	Participants, retention, proposals.
Potential Risks / Challenges	Funding limitations.
Mitigation Measures	Convince management with good examples from other Universities

Field 3	Description
Priority Rank	3
Action Plan	A11 – Develop an internal system for technology transfer and commercialization of innovations
Objective	Increase valorisation of research results.
Description of Action	Strengthen IP, licensing and industry collaboration services.
Activities	Technology assessment; IP support; brokerage.
Responsible Unit / Person	Technology Transfer Office; Innovation Centre
Timeline	2026–2028
Required Resources	TTO staff, legal support.
Expected Outputs	Commercialisation procedures and innovation portfolio.
Expected Outcomes	More patents, licences and industry cooperation.
Monitoring Indicators	Patents, licences, industry agreements.
Potential Risks / Challenges	Low researcher engagement. Funding limitations.
Mitigation Measures	Arrange informative sessions Involve more researchers into international projects Submit more R&I proposals

Field 4	Description
Priority Rank	4
Action Plan	A6 – Partner with local industries or municipalities to co-develop circular bio-based pilot solutions
Objective	Implement demonstration projects for circular bioeconomy.
Description of Action	Co-create pilots addressing biomass valorisation and resource efficiency.
Activities	Partner mapping; pilot development; monitoring; dissemination.
Responsible Unit / Person	Relevant Faculties; Municipalities; Industry Partners
Timeline	2026–2029
Required Resources	Pilot funding, technical infrastructure.
Expected Outputs	Operational pilot projects.
Expected Outcomes	Regional impact and circular solutions.
Monitoring Indicators	Number of pilots, partners, impacts.
Potential Risks / Challenges	Partner commitment. Different procedure in different sectors
Mitigation Measures	Partner meetings Quick response strategy

AUT Validation Workshop Report and Action Plans

Workshop Details:

Date : 17 July 2026

Venue : BOKU Hall, Agricultural University of Tirana

Time : 10.00 am-12.00 am.

On 17 July 2026, the Agricultural University of Tirana held a working group meeting under the BEAMING project, focused on Validating the Bioeconomy Research Action Plan. The meeting aimed to identify the university's strategic priorities, analyze existing research and laboratory capacities, and define concrete actions to support the development of the bioeconomy at the university.

The discussion began with an analysis of the university's current situation, highlighting the capacities of its faculties, institutes, departments, and research laboratories. Participants emphasized that the university has considerable expertise across various bioeconomy fields, but that cooperation between academic units and laboratories needs to be strengthened so that research can develop in an interdisciplinary manner and institutional fragmentation can be avoided.

During the discussions, it was proposed that the Individual Action Plan have a four-year implementation period, based on SMART objectives and measurable indicators for monitoring progress. The university's existing resources were reviewed, including laboratories, databases, research infrastructure, software, and electronic platforms. One of the main proposals was the creation of a shared platform to publish the university's laboratory capacities, equipment, expertise, and services.

Participants identified strengthening cooperation between faculties and establishing interdisciplinary research groups, with representatives

from all academic units contributing to bioeconomy, as a priority. It was emphasized that research should not be developed solely within individual faculties, but that joint teams should be built linking agriculture, the environment, forestry, biotechnology, economics, and other related disciplines.

Another important issue was laboratory infrastructure. The group discussed the need to modernize laboratories, expand the accreditation of analyses, and create integrated laboratories, so that the university can offer more advanced analytical services for scientific research and the private sector. It was also proposed that an institutional program be drafted to improve laboratory infrastructure and coordinate future investments.

The discussion then turned to the importance of increasing the university's visibility by publishing its research capacities on the official website, creating a shared database, and promoting research results. It was also proposed that joint research programs be created and that the university become more actively involved in European projects and international bioeconomy networks.

A specific part of the discussion was devoted to cooperation with the private sector and public institutions. The need was emphasized to build sustainable relationships with companies, civil society organizations, and other stakeholders, with the aim of transferring technology, developing final products, and practically applying scientific research results. It was also proposed that workshops and seminars be organized periodically with local and international experts to strengthen the exchange of knowledge and experience.

Participants also discussed the importance of establishing an Office for Strategic Affairs (OSA) or a similar institutional structure, which would have access to data on the university's projects, capacities, and expertise, functioning as a coordinating platform for involving internal and external experts in the development of strategic initiatives.

In the discussion on expected outcomes, it was emphasized that the university should become a national reference point for the bioeconomy, by increasing the number of international projects, scientific publications, industry partnerships, and accredited laboratories. At the same time, the importance of institutional monitoring of results and periodic reporting on the Action Plan's progress was highlighted.

The group also identified several challenges that could affect the achievement of the objectives, including the lack of stable financial resources, the shortage of experts in certain specific fields, insufficient coordination between university structures, and difficulties in securing measurable results in the short term. It was emphasized that these challenges can be addressed through strategic planning, strengthening human capacities, and expanding cooperation with national and international partners.

At the conclusion of the meeting, it was agreed that the Agricultural University of Tirana would continue drafting the Individual Bioeconomy Action Plan, focusing on: (i) establishing interdisciplinary research groups; (ii) integrating and modernizing laboratories; (iii) developing an institutional platform for managing and disseminating research information; (iv) expanding cooperation with the private sector, public institutions, and international networks; and (v) organizing ongoing knowledge-transfer activities through seminars, workshops, and training sessions. Participants agreed that these measures will contribute to strengthening the university's research capacities and reinforcing its role as a leading actor in the development of the bioeconomy in Albania.



SELECTED PRIORITIES

Priority rank	Action Area	Selection Reason
1	Strengthen interdisciplinary collaboration among faculties, researchers, and laboratories to advance bioeconomy research across agriculture, forestrym environmental sciences, economics, and related disciplines.	This action was ranked first because it is a highly feasible short-term priority that can be implemented using existing institutional capacities and strengthened internal collaboration. The established partnership with BOKU University provides a strong foundation for rapidly enhancing interdisciplinary cooperation and integrating bioeconomy concepts into curricula and syllabuses.
2	Strengthen laboratory infrastructure and analytical capacity for biomass, bio-based products, and waste streams**.**	This action was prioritised because strengthening laboratory infrastructure and analytical capacity is essential for conducting high-quality bioeconomy research and supporting innovation. While it requires medium-term investment in equipment and facilities, enhancing laboratory capacities will improve research
3	Strengthen industry partnerships to support pilot projects, technology transfer, and the uptake of bioeconomy research.	This action was ranked third because stronger industry partnerships are essential for translating research into practical bioeconomy solutions.
4	Increase participation in EU projects, international partnerships, and bioeconomy policy and dissemination activities.	This action was ranked fourth because participation in EU projects, international partnerships, and policy engagement is a continuous long-term process that builds on existing institutional capacities and collaborations.

RECOMMENDED ACTIONS

Field	Description
Priority Rank	1
Action Area	Strengthen interdisciplinary collaboration among faculties, researchers, and laboratories to advance bioeconomy research across agriculture, forestry, environmental sciences, economics, and related disciplines.
Objective	To enhance interdisciplinary collaboration among faculties, engaging academic staff, early-career researchers, and PhD students in joint bioeconomy research
Description of Action	Strengthen interdisciplinary collaboration by establishing cross-faculty research groups based on complementary expertise and competencies, bringing together academic staff, early-career researchers, PhD students, and laboratories working in agriculture, forestry, environmental sciences, economics, and related fields. To ensure the sustainability of this collaboration, permanent coordination mechanisms and regular joint research activities will be promoted. In addition, a centralized institutional database will be developed to collect and monitor research data related to bioeconomy, including carbon footprint and other sustainability indicators. This will support evidence-based research, facilitate institutional reporting, and contribute to meeting national priorities and EU requirements under Chapter 27 (Environment and Climate Change) of the EU accession negotiations.
Actions	1. Establish interdisciplinary bioeconomy research groups; 2. Develop a coordination and collaboration framework; 3. Create an institutional bioeconomy research database; 4. Disseminate bioeconomy research results by publishing data generated through research projects and promoting knowledge transfer to companies and other relevant stakeholders
Responsible Unit / Person	Faculties (5 in total and one genetic research center); Departments; Academic staff; Project and Development Office; Directory for media;
Timeline	1-2 years
Required Resources	Academic staff time, early-career researchers and PhD student involvement, coordination support, meeting facilities, and digital collaboration tools.
Expected Outputs	• Interdisciplinary research groups on bioeconomy established; • regular interdisciplinary meetings; • Operational institutional database containing bioeconomy research projects, • Bioeconomy research results published and disseminated;
Expected Outcomes	Increased institutional capacity to develop and implement high-quality bioeconomy research Available data from research in bioeconomy;

Monitoring Indicators	3 research interdisiplinary groups are established; Database is functioning;
Potential Risks / Challenges	Limited engagement of academic staff, insufficient commitment to interdisciplinary collaboration, and inadequate participation based on expertise and competencies.
Mitigation Measures	Secure institutional support and leadership commitment, define transparent criteria for participation based on expertise, recognize interdisciplinary contributions in staff evaluation, and provide incentives through research funding, networking, and professional development opportunities.

Field	Description
Priority Rank	2
Action Area	Strengthen laboratory infrastructure and analytical capacity for biomass, bio-based products, and waste streams**.**
Objective	1. Upgrade laboratory infrastructure and equipment to support high-quality bioeconomy research. 2. Strengthen coordination and resource sharing among laboratories. 3. Improve the visibility, accessibility, and utilization of laboratory services and analytical capacities.
Description of Action	This action aims to strengthen the institutional laboratory infrastructure supporting bioeconomy research by assessing existing capacities, identifying equipment gaps, and improving coordination among laboratories. It includes the inventory and digitalization of laboratory equipment, mapping analytical capacities, and publishing information on laboratory facilities, equipment, and services through the institutional website to improve accessibility, collaboration, and research efficiency.
Actions	1. Conduct a comprehensive inventory and digitalization of laboratory equipment and analytical capacities across AUT laboratories. 2. Assess laboratory infrastructure needs, identify equipment gaps, and prepare an investment and upgrading plan. 3. Develop an online laboratory database/web portal presenting laboratory facilities, equipment, analytical services, and contact information to researchers, students, companies, and external stakeholders.
Responsible Unit / Person	Faculties, departments, laboratory technicians and specialists, Procurement Unit, IT Office, Project Office, University Administration.
Timeline	2 years
Required Resources	Institutional funding, laboratory staff, technical experts, IT infrastructure, inventory management software
Expected Outputs	• Comprehensive inventory of laboratory equipment completed. Digital laboratory inventory/database established. • Laboratory needs assessment and investment plan developed. • Online laboratory platform published

	• Improved coordination among laboratories.
Expected Outcomes	• More efficient use and sharing of laboratory resources. • Increased accessibility and visibility of laboratory services. • Improved research quality and competitiveness in national and EU-funded projects. • Stronger collaboration with industry and external stakeholders.
Monitoring Indicators	Number of laboratories inventoried. Percentage of laboratory equipment digitally registered. Number of laboratories included in the online platform.
Potential Risks / Challenges	Incomplete laboratory data, limited financial resources for equipment upgrades,
Mitigation Measures	Establish a university-wide laboratory coordination team and define standardized inventory procedures,

Field	Description
Priority Rank	3
Action Area	Strengthen industry partnerships to support pilot projects, technology transfer, and the uptake of bioeconomy research
Objective	Strengthen collaboration between AUT and industry to address bioeconomy challenges
Description of Action	This action aims to strengthen collaboration between AUT and industry by establishing long-term partnerships that facilitate knowledge exchange, pilot projects, and technology transfer. It focuses on identifying industry needs, promoting the practical application of research results, and creating opportunities for joint innovation activities in areas such as sustainable biomass utilization, circular bioeconomy, bio-based products, and waste valorisation.
Actions	• Establish and strengthen partnerships with companies and relevant bioeconomy stakeholders through cooperation agreements; • Develop cooperation agreements with public institutions and national agencies to facilitate access for PhD students and researchers to laboratories, datasets, and specialized services, including reduced service fees for analyses and services required within the framework of scientific research; • Implement joint pilot projects; • Establish the Technology transfer & Innovation Office
Responsible Unit / Person	Faculties, departments, Projectand Development Office, academic staff, industry representatives, business associations, and external stakeholders.
Timeline	3 years (continuous process)
Required Resources	Academic and research staff, industry partners, funding for pilot projects, innovation and networking events, technology transfer expertise, communication and dissemination resources;

Expected Outputs	Cooperation agreements with industry established. Industry participation in research and educational activities increased. Bioeconomy research results disseminated to companies and stakeholders.
Expected Outcomes	Stronger university–industry collaboratio
Monitoring Indicators	Number of cooperation agreements signed; number of projects involved all the interest groups;
Potential Risks / Challenges	Limited engagement of private companies;
Mitigation Measures	Establish long-term cooperation agreements

Field	Description
Priority Rank	4
Action Area	Increase participation in EU projects, international partnerships, and bioeconomy policy and dissemination activities
Objective	Increase AUT's participation in EU-funded bioeconomy research and innovation programmes
Description of Action	This action aims to strengthen AUT's international dimension by increasing participation in Horizon Europe and other EU funding programmes,
Actions	Expand international collaboration by establishing new strategic partnerships, participating in European research networks, and promoting researcher mobility and joint publications
Responsible Unit / Person	Project and Development Office, International Relations Office, Faculties, academic staff, researchers, PhD students, Media Directory, University Management and Administration.
Timeline	Continuous
Required Resources	Dedicated proposal development support, researcher training, dissemination and communication resources, digital platforms for receiving the data and information on implemented studies in the field of bioeconomy;
Expected Outputs	Increased number of EU project proposals submitted. Increased participation in European research networks.
Expected Outcomes	Increased number of funded projects;
Monitoring Indicators	Monitoring the number of project proposals submitted and those successfully funded;
Potential Risks / Challenges	High competition for EU funding, lack of proper expertise in compliance with field of call;
Mitigation Measures	Improve proposal-writing support, more training and mentoring for applicants;