SMART

Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans

D8.3. Joint publication

SMART Innovation for Next Generations

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The objective of WP8 is to largely enhance the visibility of the project and reach the target groups with appealing events and content: Supporting the professional development of HEIs academic staff in the field of innovation & entrepreneurship competences development for the requirements of smart specialisation along with hybrid & online teaching practices; Setting up 7 SMART Innovation Centres at HEIs in target countries and integrating them into the existing HEI structure.; Facilitating sustainable cooperation between HEIs and the business sector through the SMART Knowledge Exchange network. Encourage student and staff work placements and (virtual) mobility; Increase the competitiveness of HEIs and their staff and the employability of their graduates with new offer of counselling and training services.

Preamble

The focus of the Project 'SMART Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans' is connected to the 'Smart' concept as such and to the Smart Specialisation areas of individual HEIs from target countries.

Objective is to demonstrate the results obtained throughout the project and select the best practice examples. Each HEI partner from the target countries selected the best practice examples from the counselling/training sessions together with the liaison partner, aiming to present project that had an impact on regional development at various levels, such as increasing awareness of smart specialization initiatives.

Table of Contents

LIST OF FIGURES

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

List of tables

List of abreviations

AI	Artificial intelligence
AL	Albania
AULEDA	AULEDA-Local Economic Development Agency, Vlore
BiH	Bosnia and Herzegovina
BPO	Business Process Outsourcing
BSO	Business Support Organization
CBHE	Capacity Building in Higher Education
CDI	The Center for Digital Innovations
CCIRS	Chamber of Commerce and Industry of Republic of Srpska, Bosnia and Herzegovina
CEM	Chamber of Economy Montenegro
CODIP	Center for Open Digital Innovation and Participation
COWEB	Collaborative Virtual International Learning in the Western Balkans Higher Education Institutions.
EDP	Entrepreneurial Discovery Process
EU	European Union
EPC	European Project Center
GDP	Gross domestic expenditure
HEIs	Higher Education Institutions
ICTs	Information Communication technologies
INSTAT	the Institute of Statistics in Albania
IoT	Internet of Things
IPA III	The Instrument for Pre-accession Assistance
JRCs	Joint Research Centre
NSS	National Smart Specialisation Strategy
MNE	Montenegro
OECD	Organisation for Economic Co-operation and Development

PPP	Public-private partnerships
RIS	Research Infrastructure Network
R&D	Research and Development
SICs	SMART Innovation Centers
SMEs	Small and Medium Entreprises
SSS	Smart Specialisation Strategy
S3	Smart specialisation
TUD	Technical University Dresden
UDG	University of Donja Gorica
UES	University of EAST Sarajevo
UNIBL	University of Banja Luka
UNIKO	"Fan S. Noli" University Korca
UNISHK	University of Shkodër "Luigj Gurakuqi
UNIVLORA	University of Vlora, Albania
UOM	University of Montenegro
VET	Vocational Education Teaching
WB	Western Balkan

EXECUTIVE SUMMARY

The SMART Project—SMART Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans—was implemented from 2022 to 2025 under the Erasmus+ Capacity Building in Higher Education (CBHE) programme. Bringing together fourteen partner institutions from Albania, Bosnia and Herzegovina, Montenegro, Slovenia, Italy, and Germany, the project set out to strengthen the role of Higher Education Institutions (HEIs) as drivers of regional innovation, entrepreneurship, and sustainable development.

The project's core objective was to empower Western Balkan universities to move beyond their traditional educational role and become active contributors to smart specialisation strategies (S3) and innovation ecosystems. Guided by the Quintuple Helix innovation model, SMART promoted collaboration between academia, industry, government, civil society, and the natural environment—ensuring that innovation is sustainable, inclusive, and regionally grounded.

Key Achievements

Over three years, SMART delivered significant structural and capacity-building results:
- Seven fully operational SMART Innovation Centres (SICs) were established across Albania, Bosnia and Herzegovina, and Montenegro. Equipped with modern infrastructure and interdisciplinary teams, they now serve as regional hubs for training, counselling, applied research, and university–business cooperation.
- Extensive capacity building was achieved through 19 internal workshops and a comprehensive Train-the-Trainer programme, reaching more than 950 participants including academic staff, students, administrative personnel, and external stakeholders. These sessions improved competences in innovation management, entrepreneurship, smart specialisation, digital transformation, sustainable development, and hybrid teaching.
- The project launched the SMART Knowledge Exchange Network, a transnational platform linking over 300 members from HEIs, SMEs, public institutions, and intermediary organisations. The Network supports ongoing knowledge exchange,

joint project development, and visibility of innovation initiatives across the Western Balkans.

- SMART facilitated university–industry collaboration through more than 70 counselling and innovation sessions, engaging over 200 external stakeholders and leading to new pilot projects in fields such as smart agriculture, sustainable tourism, digital governance, green technologies, and 3D printing.
- A comprehensive comparative analysis of Smart Specialisation Strategies (S3) in Albania, Bosnia and Herzegovina, and Montenegro enabled partners to understand regional innovation priorities, data gaps, and governance challenges, informing both institutional strategies and policy discussions at national level.

Impact

The SMART project has strengthened HEIs' capacity to contribute to regional competitiveness and sustainable development. Several systemic changes emerged:

- HEIs now possess internal structures capable of supporting entrepreneurship, innovation, and applied research.
- Students have gained real-world experience through competitions, mentoring programmes, mini-placements, and interdisciplinary teamwork.
- Business and public-sector stakeholders have developed stronger links with universities, increasing trust and collaboration.
- Regional cooperation has expanded, reflecting a growing alignment with European innovation frameworks and future S3 implementation.

The newly established SMART Centres have become physical and intellectual spaces where students, staff, and external partners co-create solutions to local and regional challenges. Their continued operation beyond the project's lifespan demonstrates the institutional commitment to sustainability.

Lessons Learned

SMART confirmed that innovation ecosystems flourish when:

- Capacity building is combined with infrastructure and long-term institutional commitment.

- Universities actively broker relationships between industry, government, and civil society.
- Students and young researchers are integrated into innovation processes from the beginning.
- Place-based approaches align global knowledge with local needs and strengths.
- Sustained collaboration and networking increase regional resilience.

Looking Forward

The project leaves behind a sustainable legacy: a network of innovation centres, trained academic and administrative staff, strengthened partnerships, and an emerging regional innovation culture.

Future priorities include consolidating the SMART Network, advancing cross-border cooperation, fostering new research collaborations, scaling student entrepreneurship, and strengthening the visibility of the SMART Centres as key regional actors in smart specialisation.

As the Western Balkans continue their progress toward EU integration, the foundations laid by SMART demonstrate how higher education can play a transformative role in building a competitive, innovative, and sustainable region.

OPENING ADDRESSES

This chapter presents the opening addresses delivered at the Final Conference of the SMART Project – *"SMART Innovation for the Next Generation"*, held in Podgorica, Montenegro, on 29 October 2025.

The following pages include speeches presented by representatives of the host institution, the Ministry, the Chamber of Commerce, and the project consortium partners. Together, they reflect on the broader context of the SMART Project, its achievements, partnerships, and the future vision of the SMART initiative.

From Vision to Action: SMART Innovation for the Next Generation in the Western Balkans

Opening Address by

Mateja Geder, DOBA University of Applied Sciences, Slovenia Project Coordinator of the SMART Project

Good morning, distinguished guests, Esteemed Vice-Rector and State Secretary at the Ministry of Education, Science and Innovation,

Dear students, colleagues, partners, and friends,

It is my great pleasure to welcome you all to the final conference of the SMART Project *SMART Innovation for the Next Generation*. Today, we gather in Podgorica to celebrate not only the results of this Erasmus+ Capacity Building in Higher Education initiative, but also the partnerships, creativity, and shared commitment that made it possible.

When we launched the SMART project three years ago, we had a very clear mission: to empower universities in the Western Balkans to become active shapers of their regional innovation ecosystems.

Our goal has been to help higher education institutions move beyond traditional academic roles and take the lead in fostering collaboration between academia, business, government, and society, driving smarter, greener, and more inclusive solutions.

The foundation for the SMART project was built on the smart specialisation efforts in Albania, Bosnia and Herzegovina, and Montenegro, and guided by the Quintuple Helix Innovation Model, which reminds us that innovation must always respect and include environment.

This project is truly a collaborative effort.

It brings together 14 partners from six countries: Italy, Germany, Albania, Bosnia and Herzegovina, and Montenegro, and Slovenia, including ten universities and four business support organisations, each bringing their own strengths and experiences.

Over 36 months, from December 2022 to November 2025, and with a total budget of nearly €900,000, we have worked together to build the capacities, infrastructure, and partnerships needed to create a lasting regional innovation ecosystem.

The project was structured through eight work packages, each one building on the previous.

We began with analysis, mapping smart specialisation priorities and understanding the needs of the region. Then we moved to capacity building, developing training programmes and building human potential among university staff and students.

Next, we established seven SMART Innovation Centres across the Western Balkans, each equipped with modern technology, trained teams, and a clear mission.

There are three centres in Albania: in Vlora, Korçë, and Shkodër.

Two in Bosnia and Herzegovina: in Banja Luka and East Sarajevo. And two in Montenegro: here in Podgorica, and at the University of Donja Gorica.

Each centre has its own focus, from business incubation, digital agriculture, smart tourism to 3D printing, but all share one goal: to make universities the beating heart of regional innovation.

Now, let's take a look at what we've achieved, because the numbers tell a powerful story.

Over the past three years, we've trained more than 950 students and staff, engaged over 200 external stakeholders, and involved 74 students in innovation contests.

We've delivered more than 70 specialised training and counselling services, organised 26 knowledge-exchange events, and supported 24 student and staff mobilities across borders.

We've also invested over 119,000 euros in new equipment and built a network of more than 300 experts in smart specialisation across the region.

But behind every number are real people: students who gained new skills and confidence, professors who found new ways to connect their teaching to practice, and partners who discovered that collaboration really can cross borders.

Over the past three years, the SMART project has taught us that collaboration truly works best when it crosses disciplines, borders, and generations.

We've seen how structured programmes, such as training, mentoring, and innovation contests, create lasting engagement, and giving students real opportunities to participate brings their ideas to life.

The SMART Innovation Centres have become more than just physical spaces. They are places of connection, creativity, and belonging.

And perhaps the most important lesson: sustainability must be built into everything we do. It's not an add-on but a mindset that ensures our results will last beyond the project itself.

As we look ahead, our vision doesn't stop here.

We aim to strengthen the visibility and outreach of the SMART Centres, and to connect them through a permanent regional network.

Together, we will continue building bridges between academia and industry, launching joint academic initiatives, and creating new opportunities for young innovators.

By aligning regional innovation policies with European goals, these centres will stand as long-term anchors of progress, capable of attracting future investment and inspiring the next generation of changemakers.

Dear colleagues and friends,

When we started this journey, we shared a vision, a vision of universities that are not just places of learning, but engines of transformation. Today, we can proudly say that this vision has turned into action.

What began as an idea has become a network of real people, real places, and real results.

The partnerships we've built, the knowledge we've shared, and the enthusiasm we've seen. All prove what is possible when we collaborate with trust, creativity, and purpose. Thank you all for your dedication, your ideas, and your friendship throughout this remarkable journey. And thank you for continuing to believe that innovation, when it's shared, inclusive, and grounded in cooperation, really can change the future.

Let's continue to innovate, together, for the next generation.

Thank you for your attention.

SMART

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

INTRODUCTION

"At its core, SMART aims to empower universities in the Western Balkans to transcend their traditional role as knowledge providers and become active shapers of regional innovation ecosystems."

1. INTRODUCTION

In the rapidly transforming landscape of higher education and regional development, the ability of universities to act as catalysts of innovation, sustainability, and entrepreneurship has never been more critical. The SMART Project – "SMART Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans" – was conceived in this context as a collective response to the persistent structural and educational challenges that hinder innovation and competitiveness in the Western Balkans.

Co-funded by the European Union under the *Erasmus+ Capacity Building in Higher Education (CBHE)* programme (2022–2025), the SMART project brings together fourteen partners from six countries: Albania, Bosnia and Herzegovina, Montenegro, Germany, Italy, and Slovenia, in a consortium that unites ten higher education institutions (HEIs) and four intermediary or business support organisations (BSOs).

At its core, SMART aims to empower universities in the Western Balkans to transcend their traditional role as knowledge providers and become active shapers of regional innovation ecosystems. By aligning higher education missions with the principles of smart specialisation strategies (S3), the project promotes an integrated approach to innovation that links research, education, and entrepreneurship within the Quintuple Helix innovation model. This framework recognises not only academia, industry, government, and civil society but also the natural environment as a key actor in sustainable growth. In doing so, the project positions HEIs as mediators between policy and practice, nurturing a new generation of professionals capable of designing, implementing, and sustaining smart and sustainable solutions tailored to their regional contexts.

1.1 The Rationale for the SMART Project

Despite notable progress in EU-supported reforms, the Western Balkans still face systemic barriers to innovation: low R&D expenditure, limited university–business cooperation, insufficient data for evidence-based policymaking, and the persistent mismatch between education outcomes and labour-market needs. The S3 approach, originally developed within the European Union to foster place-based innovation, provided an ideal framework for tackling these challenges.

However, at the start of the project, S3 implementation in Albania, Bosnia and Herzegovina, and Montenegro remained fragmented and largely exploratory. The SMART project sought to address this gap by transferring EU know-how, building local capacities, and institutionalising innovation structures within partner universities.

From its inception, SMART was designed around three interconnected levels of intervention:

a) Capacity building for academic and administrative staff;
b) Infrastructure development, through the creation of seven SMART Innovation Centres (SICs) integrated into HEIs and equipped with state-of-the-art facilities, and,
c) Networking and knowledge exchange, through the establishment of the SMART Knowledge Exchange Network that connects academia, enterprises, and policy actors regionally and internationally.

This multi-layered design ensured that human, institutional, and systemic capacities evolved in parallel, enabling tangible and sustainable transformation within and beyond partner institutions.

1.2 Objectives and Methodological Framework

The project set out to:
- Enhance the innovation and entrepreneurial competences of university staff and students through tailor-made training and a structured Train-the-Trainer model;
- Develop and implement new learning resources and thematic materials on smart specialisation, sustainability, and digital transformation;
- Establish seven SMART Innovation Centres as institutional hubs for research, training, and university–business collaboration;
- Strengthen the professional development of academic staff in hybrid teaching;
- Encourage student and staff mobility, including virtual exchanges, to promote knowledge transfer and international collaboration; and
- Facilitate the creation of a regional SMART Knowledge Exchange Network to consolidate cooperation among HEIs, businesses, and intermediary organisations.

The methodological backbone of the SMART project was rooted in participatory learning and co-creation. Each work package (WP) built on the previous one: beginning with a comparative analysis of national smart specialisation efforts (WP2), followed by staff training and capacity building (WP3), technical and operational setup of the SICs (WP4 and WP5), and finally the development of the regional network and joint dissemination activities (WP6 and WP8). Quality management and ethics (WP7) functioned as horizontal dimensions supporting all WPs throughout the project's implementation.

The implementation followed a clear sequence, from *knowledge acquisition* to *institutionalisation* and *network expansion*, ensuring that learning translated into practice.

Work Packages Overview

WP1 Project Managment & coordination

DOBA: M1 – M36

D1.1 Project management and consortium meetings
D1.2 Periodical reports
D1.3 Consortium Agreement
D1.4 Project Handbook

WP2 Comparative analysis of smart specialisation efforts within the quintuple helix innovation framework in AL, BiH, MN, and the EU

POLIMI: M1 – M4

D2.1 Knowledge Document, a consolidated report

WP3 Capacity Building – Staff Training

TUD: M5 – M13

D3.1 Training plan and materials
D3.2 Human capacity building training
D3.3 Internal Workshops

WP4 Technical setup of the SMART Innovation Centres

UES: M14 – M19

D4.1 Adequate equipment for 7 SMART Innovation centres

WP5 Operational setup of SMART Innovation Centres

UNIVLORA: M10 –M36

D5.1 7 Operational SMART Innovation centres

WP6 SMART Knowledge Exchange Network

FPM: M12 –M36

D6.1 SMART Ideas & Knowledge Network
D6.2 Training for non-partner universities and stakeholders

WP7 Quality Control & Ethics

TUD: M1 – M36

D7.1 Quality reports
D7.2 Report on measurement of KPI in LFM

WP8 Impact & Dissemination

UDG: M1 – M36

D8.1 Dissemination events
D8.2 SMART Idea student contest
D8.3 Joint Publication
D8.4 Website
D8.5 Dissemination plan
D8.6 Sustainability plan
D8.7 Memorandum of understanding

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Figure 1: Structure of the SMART Project: Work Packages and Deliverables Overview

Through the Quintuple Helix lens, all activities were designed to foster cooperation between universities, industry, government, and society, while integrating ecological awareness into innovation practice. This approach allowed partners to address regional challenges such as digital transition, sustainable tourism, green technologies, and circular economy from a holistic perspective.

1.3   Achievements and Emerging Impact

After three years of coordinated implementation, SMART has achieved a remarkable set of tangible and qualitative results:

- Seven SMART Innovation Centres established and operationalised across Albania, Bosnia and Herzegovina, and Montenegro. Each centre reflects the regional innovation profile and institutional priorities:
    - Smart City Hub at the University of Vlora;
    - SMART Business Hub at the University of Shkodër "Luigj Gurakuqi";
    - SMART Centre at the University "Fan S. Noli" in Korçë;
    - SMART Centres for Digital Innovation at the Universities of East Sarajevo and Banja Luka;
    - UDG SMART Centre in Podgorica focusing on digital agriculture and IoT applications; and
    - SMART 3D Printing and Green Innovation Centre at the University of Montenegro.

These centres have already integrated into the host HEIs' organisational structures and are offering training, counselling, and collaborative research services to students, staff, and businesses.

- Capacity building and training outcomes:

Over 950 participants took part in 19 internal workshops delivered through the Train-the-Trainer model, while 84 academic staff completed advanced training sessions led by EU partners. The workshops combined theory with experiential learning through world café sessions, case studies, and pilot projects, enabling participants to apply innovation and entrepreneurship methodologies withing their own institutions.

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

- Development of a regional SMART Knowledge Exchange Network:
  The network now includes over 300 registered members from academia, industry, and intermediary organisations across the Western Balkans and the EU. It functions as an open platform for cross-border collaboration, joint research, and dissemination of good practices. Through regional events, conferences, and digital platforms, the network has become a visible actor in promoting S3 implementation in the Western Balkans.

- Enhanced university–business cooperation:
  Through more than 70 counselling and joint innovation sessions held in 2024 – 2025, partner HEIs have initiated pilot projects with local SMEs, municipal authorities, and civil society organisations, ranging from smart agriculture and sustainable tourism to digital governance and green technologies. These initiatives have fostered mutual trust and learning between universities and enterprises, laying the groundwork for long-term collaboration.

- Contribution to regional policy alignment:
  The analytical work undertaken in WP2, which examined the state of S3 development in each target country, has been shared with national ministries and used to inform ongoing discussions on innovation governance and research prioritisation. The project has thus contributed to bridging policy and practice, providing evidence-based insights into how HEIs can operationalise smart specialisation principles.

1.4   Towards a Sustainable Innovation Culture

Beyond its concrete outputs, the SMART project has fostered a cultural shift within participating institutions. By embedding innovation and entrepreneurship into teaching practices and by institutionalising cross-sectoral collaboration, universities in the Western Balkans are increasingly embracing their third mission, i.e. to engage with society and contribute to sustainable regional development.

The project's legacy lies not only in its physical infrastructure or training achievements but also in the creation of a shared language and mindset around innovation and sustainability. The SMART Innovation Centres continue to act as living laboratories where ideas are tested, partnerships forged, and students empowered to think critically about their societal impact.

As the Western Balkans move closer to EU integration and the adoption of new cohesion and research policies, the experiences and lessons learned from the SMART project offer a replicable model of how capacity building in higher education can drive smart, inclusive, and sustainable growth.

The joint publication that follows builds upon these foundations: combining analytical perspectives on smart specialisation, institutional case studies from each country, and reflections on competence development and regional networking. Together, these contributions illustrate the transformative potential of higher education when it is guided by cooperation, openness, and shared responsibility for a smarter future.

Mateja Geder

DOBA University of Applied Sciences,
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Project Coordinator of the SMART Project

CHAPTER 1

CONTRIBUTION SMART SPECIALIZATION IN ALL WB COUNTRIES

Status-quo analysis on the national smart specialisation efforts within the quintuple helix innovation framework

Recommendations and Future steps

2. CONTRIBUTION SMART SPECIALIZATION IN ALL WB COUNTRIES

Smart specialisation (S3) is a place-based innovation policy concept that identifies regional strengths and competitive advantages, directing investments into strategic sectors. Originally developed within the EU framework (European Commission, 2021), S3 now guides policies in several enlargement countries, including those in the Western Balkans. Actors in the innovation system form a relationship or 'node' which promotes innovationin their environment Wibisono E., (2022). The innovation system, therefore, constitutes a collection of all innovation actors and can be grouped into two subsystems: exploration and exploitation (Asheim., 2022).

Effective Smart specialisation strategies should result in projects that have positive socio-economic impacts (EU, 2020). The implementation of the S3 concept is of crucial importance, as managing authorities often face difficulties to spend funding and produce tangible socio-economic impacts. The European Commission's new industrial strategy towards a green economy and digital transition increases the importance of public resources used for ambitious projects that have impact. It is still too early to assess the socio-economic impacts of projects funded through the S3 approach, but it contributes to addressing the challenges faced by regions. The next generation of S3 should be even more result-oriented with a better focus on high potential projects and ambitious outcomes and impacts.

Research infrastructures (RIs) are facilities, resources, systems and related services used by research communities to conduct top-level research in their respective fields. Universities have a crucial role to play in creating knowledge and translating it into innovative products and services, in cooperation with research centres and businesses. Successful mobilisation of the resources of universities can have a strong positive effect on the achievement of comprehensive regional strategies. Universities can contribute to regional innovation systems by stimulating the entrepreneurial spirit of their staff and students, providing advice and services to SMEs, participating in schemes promoting the training and placement of high level graduates in innovative businesses, hosting

incubators for spin-offs in science and technology parks, and providing valuable input to innovative clusters and networks. Member states must ensure that their research infrastructures are managed by professionals and that they are able to provide high added-value, financial and non-financial support services to SMEs. The barriers to improving the contribution of universities to regional growth can be internal to the university and involve the capacity to reach out to the wider region. Universities will appreciate the opportunities their regions present for their activities as 'living laboratories' opened to international linkages, and their private and public partners will benefit from their expertise for translating knowledge into innovation.

The EU landscape for research infrastructures is undergoing dynamic changes, but it is yet to bring improvement and better balance in distribution. Regional and local authorities should work in partnership to create a stairway to excellence for research and innovation infrastructures and businesses within their areas of responsibility. Investments in existing and new RIs should combine the instruments and funds available. The Regional Policy can provide financial support for the construction of RIs foreseen in the ESFRI roadmap, and Member States should set visible targets and sustainable support for operational costs and involvement of priority ESFRI projects or regional RIs. The ERDF provides financial support to create and run research infrastructures and centres of competence in a specific technology, technology transfer.

2.1 *Status-quo analysis on the national smart specialisation efforts within the quintuple helix innovation framework*

In the Western Balkans, the transition towards sustainable and knowledge-driven economic growth is closely tied to the advancement of smart specialisation strategies, innovation ecosystems, and entrepreneurship development. These are not isolated initiatives, but interconnected processes contributing to regional competitiveness and EU integration objectives. This chapter analyses the current landscape and challenges in these areas, providing academic perspectives including analysis of scientific literature, regional strategies, statistical data, and project documentation in the Albania, Bosnia and Herzegovina and Montenegro.

2.1.1   Smart Specialization in Bosnia and Herzegovina

As a bottom-up approach, smart specialisation brings together local authorities, academia, business sector and the civil society, working for the implementation of long-term growth strategies. The Smart Specialisation concept is based on a detailed analysis and identification of competitive advantages at the national and regional levels, focusing on economic, innovation, scientific, and technological potentials.

Several strategic documents provide a foundation for innovation and economic development policies within BiH. At the state level, in 2015 Bosnia and Herzegovina Directorate for Economic Planning prepared the Strategic framework for Bosnia and Herzegovina (BiH Directorate for Economic Planning, 2015). In the preparation process, valid strategic documents adopted by the BiH Council of Ministers were taken into account, as well as obligations according to the Agreement on Stabilization and Association between Bosnia and Herzegovina and the EU. The document is structured according to the strategy of the European Union 2020 and the Strategy of Southeast Europe 2020 which was adopted by the Council of Ministers of Bosnia and Herzegovina.

Aligned with the Southeast Europe Strategy 2020, Bosnia and Herzegovina's development goals in the Strategic Framework largely reflect the principles of Smart Specialisation, including smart growth through innovation, digitalisation, and quality-based competitiveness; sustainable growth through efficient resource use and local economic development; and inclusive growth through skills development and greater labour market participation.

In September 2015 Bosnia and Herzegovina, together with 192 United Nations Member States, committed to implement Agenda 2030 for Sustainable Development (Agenda 2030), which consists of 17 Sustainable Development Goals and 169 targets. Bosnia and Herzegovina recognized the importance and potential for implementation of the Sustainable Development Goals and Agenda 2030 as an opportunity to significantly improve social, economic and environmental aspects of life within the country and to enhance regional cooperation.

The first step in implementing Agenda 2030 in Bosnia and Herzegovina was the adoption of the Sustainable Development Goals Framework (UNDP, 2020), a joint document of all levels of government that sets broad development directions for achieving the SDGs. Based on an analysis of development trends, opportunities, and challenges—particularly in the context of EU accession—and extensive consultations with institutions and socio-economic stakeholders (2018–2019), three broad development pathways for sustainable development in BiH were defined: (1) Good Governance and Public Sector Management; (2) Smart Growth; (3) Society of Equal Opportunities.

The BiH Council of Ministers has approved the revised BiH Science Development Strategy 2017–2022, which sets the priorities for research and innovation. The Republic of Srpska has developed a comprehensive Industry Strategy for the period 2021-2027, alongside a comprehensive Strategy for Development of Science and Technology, Higher Education and the ICT Industry for the period 2023-2029.

The Republic of Srpska Strategy for the Development of Science and Technology, Higher Education, and the ICT Industry for the period 2023–2029 (hereinafter: Strategy) is aligned with the goals of 'Europe 2030 for Sustainable Development,' recognising education, science, research, innovation, and digitalisation as prerequisites for a sustainable EU economy and the achievement of the UN Sustainable Development Goals. Also, this strategy is harmonised with the Framework for the realisation of sustainable development goals in BiH, as well as with other sectoral strategies in the Republic of Srpska (e.g. Strategy for the Development of Small and Medium Enterprises in the Republic of Srpska for the period 2022-2027, Strategy for the Development of the Industry of the RS for the period 2021 -2027 and the Employment Strategy in the Republic of Srpska for the period 2022-2027). When developing the Strategy, the recommendations of the European Commission were taken into account, such as: introducing the concept of smart specialisation, promoting open access to scientific data - "Open Science", improving the quality of education by modernising curricula for better alignment with the needs of the domestic labour market, developing and improvement of electronic services and digital skills.

The first strategic goal of the Strategy focuses on strengthening research and development as a key lever for future growth, by enhancing its attractiveness, capacity, and links with all development areas of the Republic of Srpska. The second goal emphasises higher education as a complementary lever, improving its quality and impact on human resources. The third goal targets the accelerated development of the ICT industry, recognising its potential to create high-value jobs, drive innovation, and support digital transformation across the economy and society. The first three strategic objectives are not mutually independent but are characterised by numerous potential interactions. The fourth strategic goal defines Smart Specialisation as the main focus of interactions and concentration of resources, directing them to the recognition, development and better use of the comparative and competitive advantages we have as an economy and society.

By signing the Sofia Declaration on the "Green Agenda" for the Western Balkans in 2020, the countries of the region undertook to implement measures in the area of climate change and pollution prevention, energy and biodiversity development, mobility and circular economy, sustainable agriculture and food production. In this context, the Republic of Srpska Industry Strategy for the period 2021-2027 envisages strategic goal 5. Reduction of harmful effects on the environment. Priority 5.1. relates to Application of environmental standards in industry (transition to a green economy), while Priority 5.2. relates to Efficient use of resources in industry (transition to circular economy). The Industry Strategy of the Republic of Srpska for the period 2021-2027 characterises the cooperation between the scientific research community and the business sector as insufficient. The current cooperation between companies and the scientific community has not reached a level that enables substantial innovative outcomes. Research potential—and consequently investment in innovation—is recognized by only a small number of companies. At the same time, scientific and research institutions do not sufficiently align their research with the needs of companies or the practical application of innovations. To enhance R&D and innovation activities in the business sector, it is essential to provide targeted professional support from the scientific and research community.

Based on the strategic documents adopted by the policymakers in BiH, it is evident that their goals align with the core values and principles of the Smart Specialization Strategy. Future economic growth is envisioned to rest on innovation, increased public investment in R&D, and stronger collaboration between academia and the business sector, while ensuring environmental protection.

The first initiative for preparing a Smart Specialization strategy (S3) in Bosnia and Herzegovina (BiH) started in 2020 by the Council of Ministers establishing the S3 working group and appointing of the Directorate for Economic Planning (DEP) as the S3 process coordinator. The S3 working group of Bosnia and Herzegovina has been formed taking into consideration the country's governance architecture, including the BiH level, the two entities level (the Federation of Bosnia and Herzegovina and the Republic of Srpska), and Brcko District. It follow the Joint Research Centre (JRC) methodological Framework for Smart Specialisation in the EU Enlargement and Neighbourhood countries.

Challenges, Progress, and Prospects in Developing a Smart Specialisation Strategy in Republic of Srpska and BiH

In October 2022, the Final Report on the Quantitative analysis for Smart Specialization in Bosnia and Herzegovina (Galić & Hollanders, 2022) was prepared to identify potential priority domains for smart specialisation in BiH, based on an analysis of economic, innovation, scientific, and technological data, following the approach developed by the Joint Research Centre of the European Commission (EC).

The Report on the Quantitative analysis identified the areas of cross sectorial potential at the level of administrative units of BiH (the Republic of Srpska, each of 10 Cantons in BiH Federation and Brcko district), that could be taken into consideration in the S3 process, including the next phase of the qualitative mapping. Mapping the innovation, scientific and technological potentials for each administrative unit *was not possible* due the lack of data. However, identifying areas with an economic potential for each administrative unit provides a strong base for the following steps in the S3 process. Industries with economic potential were identified using data on employment and value added for the period 2017–2020, as well as data on product exports for the period 2010–2020.

The analysis concludes that for almost all administrative units, the identified industries with an economic potential include activities in industries which are considered – by international standards – as less technology and less knowledge intensive. Only in Sarajevo Canton, there is a high share (almost 50%) of industries that are considered as knowledge intensive. BiH and its administrative units are predominantly engaged in industries belonging to low- and medium-low-technology manufacturing, as well as less knowledge-intensive services. The absence of technology- or knowledge-intensive industries suggests that increasing the output of specialised industries through exports may have limited benefits for further economic development, as export growth would primarily rely on cost advantages achieved by maintaining low wages.

The quantitative analysis showed that the Republic of Srpska has 14 industries with economic potential, the Brčko District has 19, while in the Federation of BiH, the Sarajevo Canton records the highest number of industries with economic potential (28), followed by Zenica Doboj Canton (24), Tuzla Canton (23), Una Sana Canton (21), West Herzegovina Canton (16), Canton 10 (16), Central Bosnia Canton (13), Posavina Canton (14), Podrinje Canton (10) and Herzegovina – Neretva Canton (10).

The main conclusions are that an economy like BiH strongly depends on labour intensive and/or low-technology/knowledge intensive industries that contribute to these potentials, rather than knowledge-based sectors. According to available business statistics on employment and value added, and data for all administrative units, 214 industries across all administrative units have an economic potential combining high degrees of specialisation in both employment and value-added. Approximately 37% of the identified industries are in Manufacturing (NACE C), 46% are in Services (NACE G–N), and 17% are in Mining (NACE B), Electricity (NACE D), Water Supply (NACE E), or Construction (NACE F). Overall, two-thirds of the identified industries with economic potential fall into sectors that are considered—according to international standards (Eurostat)—as less technology- and knowledge-intensive. Only 18% are classified as medium-high technology or knowledge-intensive, while classification was not available for 15% of the industries.

In Manufacturing (NACE D), the relative absence of technology-intensive industries stands out, with only 8 industries being a medium-high technology manufacturing industry and no industry being a high technology manufacturing industry. The absence of industries that are internationally recognised as more R&D-intensive likely implies that many of the identified industries with economic potential possess either no innovation capacity or only a weak one.

Based on the comprehensive set of quantitative indicators identified in the analysis for the Republic of Srpska, the sectors demonstrating the highest development potential include Information and Communication Technologies, the Metal and Electrical Industry, Wood Processing, and Plastics.

As noted by the authors of the Report on the Quantitative Analysis, it was not possible to fully align the results for economic potential at the industry level with those for innovation, scientific, and technological potential, due to the lack of data for individual administrative units.

The results in the Report on the Quantitative analysis for S3 in Bosnia and Herzegovina have addressed a numerous challenge that has to be faced when implementing the subsequent steps of the S3 design process, especially the Entrepreneurial Discovery Process (EDP). Given the lack of quantitative results, a key challenge will be to complement the mapping of economic potential with qualitative information at the industry level, which can help to further refine the list of identified industries with economic potential. In addition, the higher education sector should aim to train students in those fields which better match the needs of the business sector in BiH. Finally, more efforts should be taken to collect more statistical data at the level of industries and administrative units. For R&D and innovation surveys, this may imply increasing sample sizes to ensure that more firms are surveyed, allowing for a reliable breakdown of aggregate BiH results by individual industries and administrative units.

The Republic of Srpska completed the Qualitative Analysis in 2023, following the steps of the Quantitative Analysis. In this report, alongside Information and Communication Technologies, the Metal and Electrical Industry, Wood Processing, and the Plastics sector,

three additional sectors were identified as having potential for specialization: Food and Beverage Production, Tourism, and Energy and Environmental Protection. The Qualitative Analysis highlighted the shortage of a highly skilled workforce in many of these sectors, as well as the need for the development of targeted educational programs and training initiatives to fully harness their innovation potential. (Pucar, 2023)

The innovation centers established through this project will certainly contribute to reducing the gap between the required and existing workforce qualifications, in order to support the implementation of the S3.

Enterprises are the main drivers of innovation around the world. However, enterprises as a whole spend very little on research and development (R&D). Gross domestic expenditure on R&D in the Republic of Srpska is extremely low. In 2022, when the quantitative analysis was done, total funds allocated for scientific and research work in the Republic of Srpska amounted to only 0.02% of GDP. For comparison, in the United States, gross domestic expenditure on R&D is 3% of GDP. In other OECD countries, it averages 2.3% of GDP, in EU countries 1.9%, and in EU candidate countries 0.7%.

Innovation is not frequently present at the enterprise level in the Republic of Srpska and appears only in a relatively small number of cases. According to the survey conducted by the Republic Institute of Statistics, since 2018 only 317 companies reported some form of innovative activity—that is, just 15.7%. A few successful examples highlight the innovation potential of the Republic of Srpska, but do not indicate a systematic utilization of its knowledge-based assets. The highest percentage of innovation-active firms is in the finance and insurance sector (48% of all companies in that sector). This is followed by the information and communications sector, with the manufacturing industry ranking third.

Companies in the Republic of Srpska receive limited support from the public sector. According to the Republic Institute of Statistics, fewer than 2% develop new technologies in cooperation with public research institutions. Some companies develop new technologies internally (34%), in collaboration with other companies (19%), with foreign experts (33%), or acquire them through licenses (10%). In the period 2020–2022, 15.1% of innovation-active companies introduced only product innovations, 40.7% implemented

business process innovations, and 44.2% engaged in both. A particularly critical issue, frequently highlighted by companies, is the lack of skilled personnel. This issue has reached a level that threatens not only the competitiveness and innovativeness of companies, but in some cases even their survival.

In the Republic of Srpska, most R&D funding comes from the government budget and is primarily allocated to research carried out by public institutions (universities and research institutes). The average productivity of our scientists (measured as the number of scientific articles published in journals per thousand inhabitants) is 0.19, which is only one-fifth to one-tenth of the average for highly developed countries. In terms of patents, highly developed countries average around 200 patents per million inhabitants, while the average in the Republic of Srpska is 1.67 patents per million inhabitants. The near-complete disconnect between the scientific research community and the business sector, further compounded by the low demand for innovation from enterprises, points to relatively limited R&D potential, and consequently, limited innovation outcomes and competitiveness.

There is a strong emphasis on the importance of drafting and implementing a S3, which would serve as a foundation and incentive for investment in R&D within promising sectors. The strategy would be implemented by stimulating innovation in entrepreneurship, modernizing and adapting the business sector, and adopting innovative solutions within public administration.

Before finalizing the S3, it is necessary to adopt the Law on Innovation Activity in the Republic of Srpska. Developing innovation activities would help connect the activities of republic institutions, the business sector, the scientific and academic community, and citizens. The result of such development would contribute to the modernization of the economy, the application of innovative production technologies, and the development of capacities and infrastructure for such activities. The law would also provide for the establishment of the Innovation Activity Fund of the Republic of Srpska, which would concentrate the funds allocated for the development of innovation, science, and new technologies. In addition to funds from the Republic of Srpska's budget, the Fund would collect donations, contributions, gifts, aid, funds obtained from international programs,

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

projects and other innovation-related activities, income generated from its own operations, and other sources.

Another drawback is the lack of an up-to-date registry of innovation system entities, which would serve as a basis for accessing innovation funding. The Law on Innovation Activity should mandate this as an obligation of the relevant ministry.

Implementation of the smart specialization concept in Bosnia and Herzegovina (model proposal)

The implementation of the concept of Smart Specialisation (S3) in Bosnia and Herzegovina faces a number of systemic, institutional and political obstacles. Here's an overview of the key problems and gaps in implementing the Smart Specialisation (S3) concept in Bosnia and Herzegovina (BiH)—drawing on recent research, policy analysis, and institutional insights:

1. Weak Institutional and Governance Structures

- Many stakeholders perceive that innovation policy is virtually absent or exists only on paper in BiH, lacking robust implementation—despite formal policies being in place. There is no unified, state-wide innovation strategy, due to BiH's fragmented institutional setup.

- The absence of clear mandates and coordination means S3 lacks a cohesive managing body. Organizational fragmentation undermines effective execution.

2. Limited Human and Technical Capacities

- BiH suffered from a shortage of dedicated staff, absence of a national S3 coordinator, weak technical support, and insufficient training - especially during the crucial design phase.

- Interviewees cited a deficit of skilled human resources and low R&D and innovation capacity, further hindering progress.

3. Funding Shortages

- Financial constraints severely limit every phase of the S3 process, from initial design through implementation.

- While some technical assistance came from the EU's Joint Research Centre (JRC), national budget allocations and other support were inadequate.

4. Lack of Participation and Stakeholder Engagement

- Many firms and stakeholders reported exclusion or noted that participatory processes were ineffective - meetings often yielded no visible outcomes, and contributions weren't taken seriously.

- Even when participant structures exist, low trust and fragmented policy fora, drawn from BiH's institutional complexity, make meaningful involvement rare.

5. Institutional Asymmetries & Policy Gaps

- The disparity between formal policies and operational reality is stark - innovation policies are nominal but not backed by concrete measures.

- This reflects broader institutional asymmetry: "Policies exist - but they don't translate into real actions."

6. Fragmented, Overly Complex Institutional Design

- Compared to other EU regions, BiH lacks a structured approach analogous to Croatia's National Innovation Council or advisory bodies - leading to diffuse accountability and fragmented governance.

- Additionally, broader governance challenges common in weaker regions - such as low institutional readiness and poor stakeholder alignment - apply to BiH.

7. The "Regional Innovation Paradox"

- Ironically, regions that most need enhanced innovation frameworks - like BiH - often lack the institutional muscle to adopt them. This is known as the regional innovation paradox, where weak structures hinder upgrading processes.

- When S3 frameworks are introduced as part of EU conditionality, rather than organic transformation, they may lack legitimacy in the eyes of domestic stakeholders.

2.1.2 Smart Specialization in Montenegro

Montenegro registered on the Smart Specialisation (S3) platform in August 2017, with the Ministry of Science coordinating the process. The Council for Innovation and Smart Specialisation is responsible for implementing the RIS3 of Montenegro. Montenegro is involved in four thematic platforms, including Solar Energy and High-Tech Farming. The National Smart Specialization Strategy is divided into three directions: Healthy Montenegro, Sustainable Montenegro, and Digitalized Montenegro. The areas for improvement include fragmentation and isolation in the scientific and research community.

The government has established the Science and Technology Park Montenegro to support and strengthen economic growth and development potential. Montenegro's priority areas are energy and a sustainable environment, sustainable agriculture and the food value chain, sustainable and healthy tourism, and ICT. The ICT sector provides business and technical support to other priority sectors. The goal is to transform Montenegro into a country with zero CO_2 production by 2050, making it an example of an economically and energy-independent country.

According to the S3 Strategy n Montenegro, Universities and other knowledge institutions should be closely linked to designing national/regional innovation strategies for smart specialisation. The Cohesion Policy's investment priorities focus on connecting universities to regional growth and developing stronger partnerships within the knowledge triangle. Universities should be key players in rural development, providing knowledge transfer and

information actions, advisory services, studies and investments related to cultural and natural heritage, and co-operation among different actors in the Union, agriculture, food chain, forestry sector and other actors. **Best practices in the Smart Specialisation field include promoting sustainability, networking opportunities, providing resources, creating collaborative spaces, focusing on technology transfer, connecting with the local environment, fostering ecology-smart agri-food chains, and water management**.

Before

An expert mission was organised in September 2018, where EU experts assisted the Montenegrin S3 team on the final steps of the preparation of the RIS3, such as creating the monitoring and evaluation mechanism. **Analysis of Economic, Scientific and Innovative Potential Mapping of economic, innovative and scientific potential** of Montenegro was completed in March 2018. The data for the mapping was extracted from various sources and provided by the local S3 team and the Statistical Office of Montenegro. For the economic mapping, industries were selected based on their current relative size measured by the number of employees, their degree of specialisation compared to the EU28, their average wages compared to those for Montenegro, export performance and a possible match with two different types of broader industry groups. For the innovation mapping, data was limited to measuring the activities of Montenegro, not for individual industries.

For the **scientific mapping**, data was used from two international data sources: Web of Science and Scimago. The results have confirmed several of the government's priority sectors: agriculture, energy, ICT, manufacturing, medicine and health, and tourism. The Stakeholder Dialogue Entrepreneurial discovery process included a series of workshops in the summer of 2018 with more than 250 participants from various segments in total. The results of the dialogue revealed the definition of five priority economic areas. It is planned that EDP focus groups will continue meeting periodically during the implementation phase and the online EDP platform will support in facilitating continuity of the process. The S3 design process in Montenegro was led by the Working Group and supported by representatives of the Ministry of Science, Economy and Education. The S3 implementation phase is managed by the Council for Innovation and Smart

Specialisation. The implementation of the RIS3 will take place based on the **Action Plan for Implementation**. In early 2021, Montenegro received expert support in developing guidelines for the implementation of operational programmes for each S3 priority area. The work on the draft of the RIS3 in Montenegro was performed in late 2018, with modifications in accordance with the JRC S3 framework and the Research and Innovation Strategy for Smart Specialisation of Montenegro has been adopted in June 2019. It has been conditionally positively assessed by the European Commission services in December 2019.

Table 1S3 Priorities in Montenegro for 2014 - 2020

Name	Description
Information and Communication Technologies	Telecommunications; Software engineering.
Renewable Energy Sources and Energy Efficiency	Energy efficiency, improvement of energy balance, reduction of energy consumption and of CO_2 emissions (renewal of buildings, implementation of LED technologies, eco active/passive facilities); Thermal anemometry research; Turbulent current fields research; Protection of electrical energy systems from atmospheric discharges; Hydro-energy; Wind energy.
Sustainable Health and Tourism	Innovative and standard therapeutic and rehabilitation programmes for patients with chronic non-communicable diseases, reconvalescents after orthopedic interventions, neurological patients, drug addicts, children with autism, athletes; Medical services including multidisciplinary diagnostics, dentistry, products and services of balneotherapy, thalassotherapy, heliotherapy, salt therapy, psamotherapy (sand) aerotherapy and mineral water therapy.

Sustainable Agriculture and Food Value Chain	**Wine and beer; Creation of new and innovative fruit, vegetable and honey products.**
New Materials and Sustainable Technologies	**Processing and use of eco-materials; Sustainable technologies in processing metals and alloys.**

Remaining Challenges

Montenegro is the first Western Balkan country to have adopted the RIS3. The S3 process in the country has been characterized by full political commitment and motivation to carry out the process in accordance with the JRC S3 framework. It is necessary to:

- *Closely follow the implementation of the RIS3;*
- *Maintain high involvement of the stakeholders in the continuous EDP during the implementation phase.*
- According to the SMART project and analysis:
- The type of National Smart Specialization Strategy of Montenegro is divided into **three directions**: 1) Healthy Montenegro, 2) Sustainable Montenegro, 3) Digitalized Montenegro. With an emphasis on the research, innovation, and economic potential of the country.
- **Healthy Montenegro** - has a unique goal of preserving health from the primary, secondary, and tertiary aspects. Therefore, the development of new methods of treatment and the production of medicines and herbs. For all this, it is necessary to protect forests from fires and devastation to protect medicinal plants and endemic species in our national parks. Encouraging innovative methods, cooperation with European experts, and exchange of experience, creation of professional staff so that the geographical competitive potential of Montenegro can come to the fore and position itself on the global market.
- **Sustainable Montenegro** - this direction implies an ecologically responsible and efficient economy from the aspect of utilisation and preservation of natural resources. Remediation of ecological "black spots" reuse of waste, intensive reduction of CO_2 that occurs as a result of the electricity production in Thermal Power Plant "Pljevlja", as well as home fireplaces and the consequences of traffic.

The integration of new, innovative, environmentally friendly sources of electricity, where in addition to PV panels, and wind turbines, should be implemented new innovations and the creation of ideas that can make a great contribution in terms of electricity production and storage.

- **Digitized Montenegro** - the development of ICT is of the greatest interest to the security and economic recovery of Montenegro. The foundations of this direction are related to better infrastructure, digital economy, and information security. It is necessary to strengthen the ICT sector through strong cooperation with the economy and the academic community in order to ensure the necessary information and cyber security at the institutional and individual level, and then strengthen the digital economy and supply the market with better quality products.
- National S3 has identified the areas in which Montenegro has **the greatest research potential**, they are of priority importance, and it is precisely these areas that must trace the path of development of the thematic areas. These are **energy, ICT, new materials, products and services, medicine and human health, agriculture and food production, sustainable development and tourism, science, education, and identity**.
- The identified priorities are divided into vertical and horizontal types:
  - Vertical:
- 1) Sustainable agriculture and the food value chain,
- 2) Energy and sustainable environment,
- 3) Sustainable and health tourism,
- Horizontal:
- 1) ICT
  - The horizontal ICT priority has the task of supporting and strengthening all other priority sectors.
- So far, Montenegro has shown the **greatest potential precisely in these areas**, based on which it could contribute to the development of the economy and the fulfilment of the national S3. By investing, encouraging new staff, and pointing out the importance of the mentioned areas, it is possible to achieve benefits in the

SMART

Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans

mentioned thematic areas, in which Montenegro expects progress and better positioning on the global market.

- SWOT showed the **weaknesses** of the Montenegro national S3, where the lack of "critical mass" in the scientific and research community due to fragmentation and isolation was highlighted, which unequivocally indicates the need to integrate as many individuals as possible, especially from the civil sector, in order to form a fertile ground for achieving valid results. This is precisely the impetus for the creation of spatial and human resources throughout Montenegro, to **avoid centralization and the negative impacts** it brings. A positive example is certainly Technopolis in Nikšić, which brought together a large number of "start-up" teams, individuals, and talented people who made an important contribution to solving various problems.

- In the partnership of the Government of Montenegro, the Ministry of Science, and the University of Montenegro, the Science and Technology Park Montenegro was established to provide **support and strengthen the economic growth and development potential** of Montenegro, through the establishment and growth of companies/teams in high-tech activities. In the focus of its work, NTP has the creation of a technological development centre which, with its various programs and activities, will provide adequate support for the improvement of the innovation-entrepreneurial ecosystem in Montenegro and thus become a generator of innovation processes.

- In order for all smart specialisation plans to be implemented, it is necessary to change the plan and program of higher education institutions and adapt it to goals and trends. It is necessary to develop centres for the development of smart specialisation ideas and their quality equipment so that all those interested young people have the opportunity to turn their knowledge and ideas into a product. In this way, **innovative and entrepreneurial competence** is encouraged in young people, which is crucial for the progress of society as a whole.

- In addition to all interested students, additional **education** of the higher education staff is also necessary, as this same staff transferred their knowledge through workshops, scientific gatherings, start-up competitions and helped the development of ideas. Primarily thinking of our students, and then of all interested individuals, who with the help of acquired knowledge and collected skills, would

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Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

get additional motivation and courage to develop innovative ideas in their environments, especially in the North and South of the country.

- A better **flow of information and exchange of experience** on the territory of Montenegro is the starting point for fulfilling the strategy and achieving concrete results, for full potential and success, the engagement of all experts and people who have experience and knowledge in the mentioned fields is necessary. Foreign experts can also make an important contribution, as demonstrated by their participation in the workshop...To meet the efficient implementation of the Smart Specialization Strategy - discussion with key stakeholders", where JRC experts for all four priority S3 areas provided guidelines for the preparation of operational programs in priority areas S3.

- For better connection and faster progress and improvement of ideas, it is necessary to develop a **virtual connection of regions**, where debates, discussions, and presentations of ideas and innovative solutions could be formed through an online platform, specialised for work in individual areas.

Montenegro is a relatively small country and it is unnecessary to make a huge diversification between regions, but certainly, through training and transfer of knowledge to young people and additional investments, **importance should be given to the North and South of Montenegro**, where enormous intellectual and resource potential is.

Based on the strategic vision of the development of Montenegro, applying the S3 methodology and implementing the **Entrepreneurial Discovery Process**, four priority areas were defined. Investment, as well as the development of innovation and research potential in selected priority areas, will create new opportunities for entrepreneurial activities and economic development based on knowledge.

The selected **priorities** are: energy and sustainable environment; sustainable agriculture and the food value chain; sustainable and health tourism; and ICT, whereby ICT is a horizontal sector, as it provides business and technical support to other priority sectors.

SMART

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

1) **Sustainable agriculture and the food value chain**

This sector strives for the preservation of biodiversity and the economic valorization of the biological potential of the autochthonous flora and fauna of Montenegro. In this regard, the multidisciplinary contribution of biologists, biotechnology engineers, chemists, forestry engineers, a large number of workforce and finally economists is needed for a good placement primarily on the domestic but also on the global market.

2) **Energy and living environment**

The growth and development of the energy and industrial needs of Montenegro must be harmonised with the standards of environmental and spatial protection.

Energy, economy, and ecology must find a common path and development that will be based on a "win-win" ideology. This sector requires dynamic changes and rapid adaptation to global trends to stay in step with the requirements and avoid paying penalties and other fines due to pollution and excessive production of CO_2. Therefore, it is necessary to create a path of development and progress through joint work and the contribution of experts in various fields. This sector should be imbued with engineers of energy, automation, information technologies, mechanical engineering, spatial planning (architecture), construction, and then ecologists and economists. Since the electric power sector of Montenegro is decentralised and the electric power market is developed, new fields of opportunity and action are opening up through joint work and the intersection of knowledge of engineering and economics...

3) **Sustainable and health tourism**

Year after year, tourism justifies its role as a very important economic branch. The attractiveness of Montenegro is reflected in its geographical location and the diversity and originality that Montenegro offers throughout the year. A large number of national parks, lakes, natural beauties, and content is an important catalyst in the process of European integration. There is also a huge space for additional diversification of content and enrichment of the offer and quality of service. Montenegro needs staff and training, especially in the field of medical tourism, since it is a great development opportunity. A significant workforce, investment in roads, and promotion are needed.

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

- **ICT**

Information and communication technology is unequivocally present and necessary in all other priority areas. ICT enters into all the pores of activity and has a large space for progress and development. In the field of electronics and digital technologies, through the application of microprocessors and sensors for various purposes. Information support, development of platforms, and content that accelerates, facilitates, and helps sectors such as medicine, education. But also in terms of cyber security, communication, information flow, and managing the power sector.

The **decision-makers** who could influence and speed up the process of smart specialisation are unequivocally the representatives of the Government, led by the Ministry of Science and Technological Development, as well as the Ministry of Economy. The Council for Innovation and Smart Specialization, which consists of 19 members and is currently chaired by Biljana Šćepanović, Minister of the Ministry of Science and Technological Development. Innovation Fund, Science and Technology Park, Technopolis and possible regional centres. In addition to the competent ministers and advisors to the Prime Minister, the **innovation council** includes representatives of the academic and economic sectors, as well as a representative of the Community of Montenegro in order to improve relations with local self-governments.

While Montenegro presents a growing entrepreneurial culture, the startup ecosystem faces several challenges, including limited access to venture capital, regulatory complexities, and brain drain due to skilled workforce migration. However, the country also offers significant opportunities in digital transformation, green innovation, and cross-border collaboration with European markets. Expanding financial support mechanisms, improving regulatory conditions, and strengthening networks between startups and investors will be essential for positioning Montenegro as a regional startup hub.

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

2.1.3   Smart Specialization in Albania

The **mapping of the innovation potential in Albania** (Fabbri et al., 2022) was conducted using the "Innovation activity survey" conducted by the Institute of Statistics in Albania (INSTAT) for the period 2017-2019. The analysis identified **two NACE 1-digit industries** with a current and emerging innovation potential: **J-Information and communication technologies**, and M-Professional, scientific and technical activities. The quantitative analysis highlighted the particular relevance of the ICT sector and identified the following subsectors: J60.1 Radio broadcasting, J60.1 Television programming and broadcasting activities, J61.1 Wired telecommunications activities, and J61.3 Satellite telecommunications activities. The qualitative analysis combined an on-line survey with 60 in-depth interviews among relevant stakeholders of the territory to validate previous statistical results and identify the sub-sectors and niches with high potential for innovation. In particular, interesting development opportunities emerged in digital transition (with the

automation of processes, the reorganisation of supply chains and the digital transformation that can lead to new business models) and more in general in digital technologies (from applications of artificial intelligence, IoT sensors - industrial Internet of Things, data analytics, to robotics). The ecological transition.

The analysis identified the following **subsectors as potentially interesting for further exploration during the EDP**: Blue economy, Healthy food, Renewable resources energy, and Extended BPOs (Business Process Outsourcing). The availability of data was a challenge, with detailed economic data not being directly available and detailed data on innovation activities not available. The report comprises eight chapters, with the first chapter giving an economic outlook of Albania, the methodology used and results from the quantitative mapping for the economic, innovation and scientific potential, respectively.

The Gross Domestic Product (GDP) in 2020 was estimated at 1,644,077 million Albanian Lek (ALL), with a negative change from 2019 (Fabbri et al., 2022). GDP per capita in 2020 reached 579 thousand ALL (or € 4,681) from 593 thousand ALL (or € 4,819) in 2019. **Agriculture, forestry and fishing** is the largest percentage of GDP, followed by Wholesale

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

and retail trade, repair of motor vehicles and motorcycles and Construction. Manufacturing and Real estate activities are also large industries. Albania is divided into 3 NUTS one-digit regions and 12 NUTS two-digit regions.

The highest number of **enterprises** is located in Tirana, followed by Fier and Korca. Mining & Quarrying employs most of its workers in Diber with 30% of employees followed by Fier and Tirana. For the services sector, there is a significant difference between Tirana and other regions, where the former employs 62% of total employees in services (Fabbri et al., 2022). The Manufacturing sector is concentrated in Tirana with 37% of employees followed by Durres with 21% of employees. Agriculture is one of the most important sectors in Albania, contributing 20% to GDP in 2021.

About 24% of its territory is classified as **agricultural** land. Agricultural exports, which include livestock, agriculture and agro-processing products, amounted to 30,517 million of ALL for 2018 or 9.8% of total exports. Edible vegetables and certain roots have the

highest export share, followed by Oil seeds and oleaginous fruits. Exports of agricultural products, especially fruits and vegetables, increased in double digits. In April 2020 compared to April 2019, there was an increase in exports by 14% due to private and public investments in the agricultural sector. Albania exports 75% of fishery products and 99% of medicinal and aromatic plants for about 300 wild species.

Albania exports **80 aromatic medicinal plants** mainly to the EU, Australia, US, Canada, India and China. Exports have increased significantly since 2010, reaching 30 million USD in 2016 and 41 million USD in 2019. 90% of the farmers are located in Shkodra, driven by government subsidy schemes.

The Covid-19 pandemic has had a severe effect on Albania's economy (Fabbri et al., 2022), with an economic contraction of about 4% in 2020. The private sector has gone through shortages of clients and lack of liquidity, and remittances have decreased by almost one-fifth. Trade has also been affected, especially in industrial sectors, and exports contracted 35%. To address the difficult situation, the government of Albania adopted two support packages for vulnerable people and businesses affected by the pandemic,

which allocate in total 45 billion ALL (2.8% of GDP). Agriculture and Real Estate Activities are the only sectors growing, while Trade, transport and hospitality services (-27%) and Wholesale and Retail Trade and Accommodation and food service activities (-15%). Tourism, which accounts for more than 20% of Albania's GDP, was one of the most affected sectors due to travel restrictions (Fabbri et al., 2022). In July 2020, incoming and outgoing flows of tourists decreased by around 62% compared to 2019.

The analysis (Fabbri et al., 2022) identified **13 industries with static economic potential and 16 industries with dynamic potential**. Two industries have both static and dynamic potential: J61.3 Satellite telecommunications activities and N82.2 Activities of call centres. Exports of goods identified 10 largest subsections, including 64 Footwear and 27 Petroleum oils and oil obtained from bituminous minerals. Matching the results from the economic and innovative potential analyses, a first selection of industries lead to the following: J60.1 Radio broadcasting, J60.1 Television programming and broadcasting activities, J61.1 Wired telecommunications activities, Current and emerging economic potential and innovation potential, J61.3 Satellite telecommunications activities, and

J61.3 Satellite telecommunications activities. The analytical unit of analysis is not the industry, but the field of science. Industries that are good candidates for the upcoming phases of Smart Specialisation design are those that would potentially provide the largest increase in wages and employment from targeted research and innovation investment, with those with existing development and support programs (Fabbri et al., 2022), to which the Energy sector should be added:

- (NACE A) – Agriculture, forestry and fishing
  - A01.6 - Support activities to agriculture and post-harvest crop activities
  - A03.21 - Marine aquaculture
  - A03.1 – Fishing
- (NACE C) – Manufacturing
  - C10.8 - Manufacture of other food products
  - C24.5 Casting of metals
- (NACE I) – Accommodation and support service activities
  - I55.9 – Other accommodation

- (NACE J) – Information and Communication
  - J61.3 – Satellite telecommunications activities
  - J62.09 – Other Information technology
- (NACE N) – Administrative and support service activities
  - N82.2 – Activities of call centres
  - N82.9 – Business support services activities

Qualitative data from the same research (Fabbri et al., 2022) corroborate the results from the Quantitative Analysis, identifying relevant domains to be further explored for the final selection of the Smart Specialisation priorities. **Agriculture, Fisheries and Aquaculture, Manufacturing, Energy, Accommodation and support service activities, Information and Communication, and Administrative and support service activities are the selected domains. Strategic infrastructures, especially related to energy provision, digital and transport connectivity, are an important driver of development and a source of uncertainty**. There is a mismatch between VET and higher education curricula, on the one side, and labour market requirements, on the other side. Public research is considered to be below European standards and considerably underfunded, leading to collaborative protocols between companies and universities, but mainly oriented to talent scouting and internships rather than on R&D.

International megatrends, such as **digital transition** (including automation of processes, reorganisation of supply chains and digital transformation) are seen as interesting development opportunities. The most important details in this text are related to the challenges of cross-fertilization and integration of supply chains. These challenges include the absence of large national industries, low demand for consumption and investments, and the need to look outside of the country for international partnerships and cooperation opportunities, foreign direct investments, and positive externalities coming from diaspora. AIDA's activities, specific sectoral regulations, as well as some specific programs, represent good starting points to unlock the growth potential (Fabbri et al., 2022). Additionally, a **number of cross-sectorial areas** could also be considered for possible investigation during the EDP due to the economic situation due to pandemics and difficulties in qualitative data collection.

The activities for the definition of the S3 should increase the number of stakeholders involved and organise further interviews, focusing more on the way value chains are organised, their potential and bottlenecks, and how value chains may contribute to the sustainable development of the country (Fabbri et al., 2022). The subsequent EDP phase can contribute to this, providing further insights on the identified areas and integrating the strengths, weaknesses, opportunities and threats outlined in the report.

The Albanian Smart Specialisation process **is being organised at the national level** by keeping a regional perspective when looking at the development state and potential of Albania's 12 counties.

- **All the sectors are considered** for the Smart Specialization Strategy: ICT, Blue economy, and Energy have a great territorial relevance, as well as development opportunities. Nonetheless, they also show structural weaknesses that require investments and a strong commitment by the National Authorities.
- **Industries that are good candidates** for the phases of Smart Specialisation design are those that would potentially provide the largest increase in wages and employment from targeted research and innovation investment, as well as those with existing development and support programs:
  - Bio-economy and agriculture (Agriculture, forestry and fishing),
  - Manufacturing,
  - Tourism,
  - Business & services,
  - Accommodation and support service activities,
  - Information and Communication,
  - Administrative and support service activities,
  - Energy is also an area where there is potential for smart and innovative growth in the future.

The National Smart Specialisation Strategy (NSSS) identifies **long-term investment priorities shared with the Regions and main stakeholders**, ensuring complementarity between the actions planned at the central and territorial level, respectively, so as to reduce the duplication and/or overlap risks and strengthen their impacts. The objective is to create

new value chains that, starting from R&D, will reach the generation of innovative products and services and development of key enabling technologies for the creation of subsequent generations of products aiming to increase wealth, improve its distribution and bet on the possibility of creating new jobs that can last over time. "The ongoing digital transformation affects every aspect of our lives. We should embrace it and make sure it has a positive effect on productivity, growth, employment and well-being – while meeting our ambitious sustainability goals."

The **Digital Agenda Albania 2022-2026** aims to promote investments in key IT areas advanced data processing, artificial intelligence (AI), cyber security, and advanced digital skills needed to develop them. It has the potential to connect businesses, public administration, students and citizens with the latest technologies and resources and will help to be competitive and strategically autonomous, developing and leading society towards Digital Transformation. Digital competencies are crucial skills that allow individuals, especially students to engage in new ways of learning. They equip the teaching staff with expertise on how to use information and communication. Also, practical learning, time management, and combined learning methodologies are some of the impacts that technology could have on student learning.

Technology in education leads to improved quality of studying; better communication facilitates skills and knowledge for students.
There are **relevant challenges related to data availability** in the first case, and difficulties in reaching out with the stakeholders of the priority areas selected, for a number of reasons including mistrust, post-COVID effects and related constraints, as well as lack of information on Smart Specialisation.

Key ICT statistics support the reports' findings, showing that **Albania is on a good trajectory of development**, with more than 75% of its population using the internet and more than 95% of enterprises having access to the internet, which is above the EU average. Furthermore, in the area of eGovernment services, which is one of the most important Action Lines of the World Summit on Information Society (WSIS) Tunis Agenda, Albania has made great strides. The establishment of the e-albania.al governmental portal has

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

brought more than 600 e-services available to citizens, businesses and government institutions and more than 1,300,000 registered users.

Academic disciplines needed are:
- o Information and communication technologies,
- o Engineering, manufacturing and construction,
- o Services,
- o Business, administration and law,
- o Agriculture, forestry, fisheries and veterinary.

There is often a **mismatch between VET and higher education curricula**, on the one side, **and labour market requirements**, on the other side. In particular, some curricula are very slow to adapt to international standards and requirements. In the end, this implies that companies are responsible for providing training courses, which may be very difficult especially for segments with a higher knowledge intensity competition. In general, public research is considered to be below European standards and considerably underfunded in comparison with other economies of the macro-region. This often leads to collaborative protocols between companies and universities, but mainly oriented to talent scouting and internships rather than on R&D, which often relies on foreign provision.

Smart Specialisation suggests that the most effective way to deliver innovation, and ultimately regional or national economic development, is to support stakeholders to come together to reach an agreement on concentrating public and private interventions and resources on a limited number of priorities, based on local/ national competitive advantage. Smart Specialisation is a bottom-up approach, which is seen as Smart - it aims to identify the region's specific strengths and assets; Specialised - it aims to target research and innovation investment on these strengths, and Strategic - it aims to support stakeholders to define **a shared vision for regional innovation**.

2.1.4   Progress and Challenges

Western Balkan countries have made initial steps toward adopting S3 methodologies, supported by EU-funded technical assistance and pilot initiatives. As more regions implement Smart Specialization innovation policies, the knowledgebase on Smart Specialization implementation is also growing (S ̈orvik et al. 2019). However, common challenges persist:

- Weak innovation systems and underdeveloped research infrastructure (World Bank, 2022).
- Limited collaboration between academia and industry.
- Fragmented entrepreneurial discovery processes (EDP).
- Reliance on donor-driven projects without sustainable national policies.

Priority Sectors Identified

Based on national and regional analyses, key sectors prioritized include:

- ICT and Digitalisation
- Agri-food and Sustainable Agriculture
- Renewable Energy and Green Technologies
- Sustainable Tourism
- Cultural and Creative Industries

These sectors align with both local resources and global trends in sustainable development.

Innovation Ecosystems: Current State and Barriers

Ecosystem Characteristics. Innovation ecosystems in the Western Balkans are characterized by:

- A growing number of innovation hubs, technology parks, and startup incubators.
- Increased participation of universities in knowledge transfer activities.
- Early-stage development of public-private partnerships (PPP) supporting R&D initiatives.

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Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

Barriers to Innovation

- Low R&D expenditure (below 1% of GDP in most countries).
- Limited venture capital and access to alternative financing.
- Skills mismatch between university outputs and labor market needs.
- Brain drain, exacerbating human capital shortages.

Policy Responses and Good Practices

Examples such as the Western Balkans Innovation Support Programme and EU-funded projects like Horizon Europe demonstrate growing institutional capacity to coordinate innovation policies regionally.

Entrepreneurship Development: Drivers and Constraints

Youth and Digital Entrepreneurship

- Increasing interest in startup competitions, hackathons, and entrepreneurship education initiatives.
- Government programs supporting startups, digital skills training, and small business grants.
- Non-governmental organizations and international donors play key roles in ecosystem stimulation.

Barriers to Entrepreneurship

- Regulatory complexity and administrative burden.
- Access to early-stage financing remains a significant obstacle.
- Entrepreneurial culture is still developing, particularly in non-capital regions.

Practical Interventions

- Expanding university-based entrepreneurship centers.
- Strengthening mentorship programs and networking platforms.
- Incentivizing female entrepreneurship and rural innovation initiatives.

Sustainable Smart Specialisation Solutions in the Western Balkans

Academic research highlights that smart specialisation involves a place-based, evidence-driven approach, which identifies and prioritizes key sectors with comparative

advantages. For the Western Balkans, sustainable S3 solutions are tailored to address regional challenges such as economic diversification, environmental sustainability, and social inclusion. Key aspects include:

Alignment with regional and EU policy frameworks: S3 in the Western Balkans aligns with EU cohesion policies and green transition agendas, encouraging sectors like digital technologies, sustainable tourism, and renewable energy (European Commission, 2021).
Stakeholder involvement through Entrepreneurial Discovery Process (EDP): Universities, businesses, policymakers, and civil society jointly identify innovation priorities, ensuring inclusivity and relevance (Foray et al., 2012).

Focus on sustainability: Emphasis on green technologies and circular economy principles to ensure long-term environmental and economic resilience (OECD, 2023).

Innovation and Entrepreneurship Competence Development

Building competencies in innovation and entrepreneurship is fundamental for the success of S3 initiatives. Academic literature stresses the importance of:

Entrepreneurial education and training: Integrating theory and practice to develop skills such as opportunity recognition, business model development, and digital literacy (European Training Foundation, 2022).

Mentorship and peer learning: Effective mentoring programs enhance confidence and problem-solving capabilities, providing real-world insights and networks (UNDP Albania, 2023).
Access to support services: Business incubators and accelerators offer resources, financing advice, and market access, crucial for startup survival and growth.

2.2 Comparative Analysis Across Western Balkan Countries

The smart specialisation trajectories of Albania, Bosnia and Herzegovina, and Montenegro show significant differences in institutional readiness, data availability, and policy maturity, yet they share important structural similarities.

Different stages of S3 maturity

- **Montenegro** is the most advanced, with an adopted RIS3 (2019), structured coordination (Council for Innovation and Smart Specialisation), and active participation in thematic platforms.

- **Albania** is progressing with completed quantitative/qualitative mapping, strong ICT sector growth, and a structured EDP underway.

- **Bosnia and Herzegovina** is at an earlier design stage due to institutional complexity, limited data availability, and the absence of a unified innovation strategy.

Shared regional characteristics

Common challenges across all three countries include:

- Low investment in R&D
- Skills gaps and mismatch
- Weak innovation–industry linkages
- Dependence on low-tech manufacturing
- Fragmented innovation ecosystem
- Brain drain and limited research capacity

Convergence in priority domains

Despite different starting conditions, all three countries converge on:

- ICT and Digitalisation
- Sustainable agriculture and food processing

- Renewable energy and green technologies
- Tourism (including sustainable & health tourism)
- Emerging cultural/creative industries

Governance differences

- **Montenegro** → centralised, coherent model
- **Albania** → national-level coordination with regional elements
- **Bosnia and Herzegovina** → the most decentralised system (state / entity / cantonal levels), complicating S3 alignment

2.3 EU Good Practices Relevant for the Western Balkans S3

European regions offer transferable lessons important for strengthening Smart Specialisation in the Western Balkans.

1. Continuous Entrepreneurial Discovery Process (EDP)

Successful EU regions conduct regular, structured EDP cycles rather than one-off meetings. Innovation councils or committees coordinate stakeholder engagement and validate priorities.

2. Monitoring, evaluation, and transparency

EU regions use measurable indicators, dashboards, and Eye@RIS3 to track the evolution of specialisation domains, monitor funded projects, and ensure accountability.

3. Cross-border and macro-regional collaboration

EU macro-regional strategies (EUSAIR, EUSDR, Interreg programmes) show how countries can jointly develop innovation value chains in areas such as:

- Blue economy
- Sustainable tourism
- Renewable energy
- Infrastructure modernisation

4. Universities and research organisations as innovation anchors

Advanced EU regions integrate universities as:
• technology transfer facilitators,
• incubators/accelerators hosts,
• living labs coordinators,
• entrepreneurship education centres.

5. Social innovation and citizen engagement

EU practices increasingly emphasise co-creation, participatory labs, and social innovation to ensure that technological progress aligns with societal needs.

2.4 *Cross-cutting Themes in the Western Balkans Smart Specialisation*

Several cross-cutting themes appear consistently across Western Balkan S3 strategies:

Digitalisation

ICT is a horizontal enabler for nearly all priority sectors — from tourism and public administration to agriculture and energy.

Circular economy & resource efficiency

Growing attention to waste reduction, green production, energy efficiency, sustainable agriculture, and the Green Agenda.

Smart cities & smart communities

Tech-enabled public services, mobility solutions, and citizen-centred innovation are emerging fields.

Human capital & skills development

Skills shortages are a key bottleneck; stronger VET–university–industry cooperation is necessary.

Regional cooperation

Given small domestic markets, regional innovation value chains are essential for scaling S3 sectors.

2.5 Environmental Dimension within the Quintuple Helix Framework

The Quintuple Helix model highlights the environment as an active driver of innovation.

Environmental priorities influencing S3

- Montenegro's zero-CO2 ambition

- Albania's sustainable use of agriculture and marine resources

- Bosnia and Herzegovina's Green Agenda commitments

- Regional emphasis on biodiversity, water management, and pollution reduction

Involvement of environmental stakeholders

Environmental NGOs, local communities, and civil society contribute unique insights. Their participation enhances ecological sustainability and supports EU Green Deal alignment.

Ecological innovation opportunities

Areas where environmental sustainability intersects with innovation include:
• Renewable energy systems
• Sustainable tourism
• Low-impact agriculture
• Circular economy technologies

2.6 Insights from Focus Groups and Stakeholder Consultations

Focus groups across Western Balkan partner countries revealed common needs and opportunities.

1. Incubation and early-stage support

Stakeholders favoured decentralised incubator networks linking multiple universities and local innovation actors.

2. Technology demonstrators

Testbeds and demonstrators in agriculture, tourism, mobility, energy, and ICT were seen as critical for practical validation and industry uptake.

3. Entrepreneurship competences

Stronger entrepreneurship education, mentoring, and challenge-based learning were identified as key success factors.

4. Better coordination and communication

Stakeholders emphasised the need for:
• unified information platforms
• improved visibility of public programmes
• cross-regional collaboration tools

2.7 Alignment with SDGs and the EU Green & Digital Twin Transition

Smart Specialisation in the WB aligns closely with:

The Digital Transition

• Data economy, ICT, AI, cybersecurity
• e-Government services (e.g., Albania's digital transformation)
• Digital skills for youth and professionals
Linked to SDGs 4, 8, 9, 16.

The Green Transition

• Renewable energy and low-carbon development
• Circular economy models
• Sustainable agriculture
• Green mobility
Linked to SDGs 7, 11, 12, 13.

Alignment with SDGs unlocks additional EU and international funding opportunities and strengthens strategic coherence.

2.8 Strengthening Research Infrastructures & Technology Transfer

RIs and technology transfer mechanisms remain underdeveloped across the Western Balkans.

Key needs include:

• professional management of research infrastructures
• "stairway-to-excellence" alignment with EU programmes (Horizon Europe, ESFRI)
• strengthened TTOs and IP management
• regional R&D collaboration platforms
• investment in digital research capabilities (HPC, data repositories)

Role of SMART Innovation Centres

Planned centres can become regional hubs for:
• prototyping
• incubation
• skills development
• university–industry collaboration
• applied research and testing

2.9 Recommendations and future steps

Based on challenges identified, here are some enablers and next steps:

- Invest in human capital - build teams with technical, administrative, and analytical expertise.

- Secure reliable funding, both public and from international partners, to enable long-term implementation.

- Revamp participatory mechanisms to ensure meaningful stakeholder inclusion and tangible follow-up.

- Simplify governance, defining clear roles and reducing overlap across entities.

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- Align with local realities, not impose external conditionalities without local adaptation and buy-in.

Implementing the Smart Specialisation Strategy (S3) effectively in Bosnia and Herzegovina (BiH) requires adapting the EU framework to the country's complex institutional structure, limited capacity, and development needs. While BiH faces unique challenges, it also has untapped potential - especially in sectors like ICT, renewable energy, agri-food, and creative industries.

Here's a step-by-step approach for successful S3 implementation tailored to BiH's realities:

1. Establish Clear Governance and Coordination
Problem: Fragmented governance and institutional complexity.
Solution:
- Develop S3 working groups at the entity (FBiH, RS) and Brčko District levels, with structured links to the national body.
- Create an S3 Steering Committee with representatives from:
  - Public sector (state, entity, cantonal)
  - Private sector (chambers, SMEs)
  - Academia and research institutions
  - Civil society and youth

2. Perform a Quality Entrepreneurial Discovery Process (EDP)
Problem: Stakeholders feel excluded or involved only superficially.
Solution:
- Organize inclusive consultations with entrepreneurs, clusters, and researchers using bottom-up engagement methods.
- Use regional innovation platforms to gather sector-specific knowledge and opportunities.
- Include diaspora entrepreneurs and experts to bridge knowledge gaps and promote investment.
- Prioritize transparency: publish EDP findings, decisions, and feedback.

3. Map Regional Strengths & Identify Priorities
Problem: Lack of data-driven, realistic priority setting.
Solution:

- Conduct a detailed SWOT analysis for each region (e.g., Sarajevo, Tuzla, Banja Luka) based on:
  - Economic performance
  - R&D infrastructure
  - Export profiles
  - Workforce skills

- Use this to identify a limited number of smart specialisation domains, such as:
  - ICT and digital services
  - Renewable energy and environmental technologies
  - Agri-food and food processing
  - Tourism and cultural heritage
  - Metal and automotive industries (especially in RS and Herzegovina)

4. Invest in Capacity Building & Innovation Infrastructure

Problem: Weak technical and human capacity; low innovation readiness.
Solution:

- Establish innovation support centers (e.g., technology parks, incubators) near key universities.
- Strengthen university-industry collaboration with incentives for joint R&D projects.
- Offer training for policymakers and regional development agencies on innovation management, monitoring, and policy evaluation.
- Digitally link all actors via a national innovation platform for collaboration, funding opportunities, and knowledge sharing.

5. Mobilize Funding & Align with EU Support Mechanisms

Problem: Lack of sustained, adequate financing.
Solution:

- Secure state-level and entity-level budget allocations for S3 implementation.
- Align S3 priorities with EU funding instruments, including:
  - IPA III
  - Horizon Europe
  - Digital Europe
  - Interreg
- Create public-private co-financing schemes to de-risk innovation investments for SMEs.

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- Develop incentives for FDI in targeted sectors, linked to smart specialisation goals.

6. Develop Monitoring, Evaluation, and Learning Systems

Problem: No meaningful follow-up or learning loops.
Solution:
- Design a real-time S3 Monitoring Dashboard using KPIs such as:
  o Number of R&D projects funded
  o SME participation in innovation programs
  o Export performance of smart specialisation sectors
- Implement adaptive learning mechanisms to revise priorities based on new evidence.
- Use evaluation results to justify continued investment and build trust among stakeholders.

7. Promote Policy Ownership and Political Support

Problem: S3 seen as imposed by EU rather than locally owned.
Solution:
- Communicate the economic and social benefits of S3 to the public and political actors.
- Use media and local champions to popularize success stories from pilot regions or sectors.
- Promote inter-entity cooperation around shared innovation goals (e.g., energy transition, export markets).

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Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

CHAPTER 2

BUILDING KNOW-HOW FOR SMART SOLUTIONS AND COMPETENCE DEVELOPMENT (AL, MNE and BiH)

"The methodology and thematic focus of the seven internal SIC workshops, then presents community engagement and networking strategies employed to involve students,administrative personnel and faculty in building sustainable innovation communities."

3. BUILDING KNOW-HOW FOR SMART SOLUTIONS AND COMPETENCE DEVELOPMENT (AL, MNE and BiH)

The Western Balkans region has long grappled with high unemployment, limited innovation capacity and uneven access to advanced technologies, all of which constrain its economic performance and social cohesion (Paunović & Kosanović, 2019; Estrin & Uvalić, 2016). In response, the SMART project—co-funded by the European Union under the Erasmus+ CBHE (Capacity Building in Higher Education) programme—seeks to strengthen the region's innovation ecosystem by empowering seven Higher Education Institutions (HEIs) in Albania, Bosnia & Herzegovina and Montenegro. At the heart of this initiative are seven SMART Innovation Centres (SICs), each tailored to thematic priorities such as smart cities, smart agriculture, digital transformation, circular economy and entrepreneurship support. By bridging academic research and labour-market needs, these centres aim to transform HEIs from traditional knowledge providers into active drivers of regional development and socio-economic resilience.

Grounded in the Quintuple Helix Innovation Model—which emphasizes collaboration among universities, industry, government, civil society and the natural environment (Carayannis & Campbell, 2012)—the SMART project fosters multi-sector partnerships, capacity building and open innovation. Its strategic objectives include the creation of locally adapted learning modules, professional development of academic staff, sustainable HEI-business cooperation via the SMART Knowledge Exchange network, and expanded student and staff mobility—both physical and virtual.

This paper first describes the methodology and thematic focus of the seven internal SIC workshops, then presents community engagement and networking strategies employed to involve students, administrative personnel and faculty in building sustainable innovation communities. It proceeds with a qualitative content analysis of ten standardized interviews conducted across partner HEIs, highlighting both shared experiences and country-specific nuances. Finally, a comprehensive quantitative evaluation of the internal workshops captures participant feedback on organization, content relevance, instructional quality and infrastructure, offering evidence-based recommendations to inform future iterations and broader smart specialisation efforts in the Western Balkans.

3.1 *Theoretical Background*

A complex political landscape and fragmented regional cohesion characterise the Western Balkans region. However, it experiences a remarkable transformation rate, influenced by the interaction of its geographical features and historical events. The Western Balkans countries strive to advance their economic development and foster innovation (Trošić and Arnaudov, 2024; Dora and Botić, 2022). Throughout its history, the region has grappled with significant economic and social challenges, including high unemployment, limited innovation, and restricted access to advanced technologies (Paunović and Kosanović, 2019; Estrin and Uvalić, 2016). In recent years, there has been a concerted effort to shift towards a knowledge-based economy and improve the region's overall economic performance. The economies of the Western Balkans are actively modernising their economies, societies, and policies to shift towards the quadruple to the Quintuple Helix model (Carayannis & Campbell, 2010; Vallance et al., 2017; OECD, 2024). Addressing this transition, our study explores the dynamics within the Western Balkan Region, addressing the challenges in the field of smart specialisation and the related transversal competence development through internal workshops.

The Triple Innovation Helix Model, developed by Etzkowitz and Leydesdorff (2000), centres on the interactions between universities, industries, and governments. The Quadruple Helix, proposed by Carayannis and Campbell (2009), expands on this model by incorporating a fourth component: the 'media-based and culture-based public', with 'civil society'. In the recent decade, the evolution of the triple helix innovation model has seen extensions to a quadruple and a quintuple model to provide a more overarching set-up for modelling innovation (see Galvao et al., 2019). The Quintuple Helix model, as conceptualised by Carayannis and Campbell (2010), goes further by not only building on the Quadruple Helix but also integrating the 'natural environments of society' as an additional dimension, making it more comprehensive and wide-ranging. This model effectively captures the innovation ecosystem's tightly coupled and interdependent nature (Carayannis & Campbell, 2012).

According to Radovanovic, N. et al. (2024), Albania started its S3 designing process in 2018. The country has finalised the mapping activities and the Entrepreneurial Discovery Process (EDP) phase. Smart Specialization Strategy is based on the concept that regions

should pinpoint and invest in their unique strengths and capabilities. It highlights the importance of innovation, entrepreneurship, and collaborative governance to boost regional competitiveness. The potential benefits of Smart Specialisation and knowledge-based economic cooperation in the Western Balkans include enhanced competitiveness, job creation, sustainable economic development, and integration into global value chains (Radovanovic et al., 2024).

Bosnia and Herzegovina launched the Smart Specialisation design process in 2018. The first achievement was establishing the S3 working group, which was approved by the National Council and coordinated by the Directorate for Economic Planning.

Montenegro launched the Smart Specialisation process in 2018. The S3 was adopted in June 2019, and the formal assess-ment of the strategy by the European Commission services (inter-DG panel) was carried out in October 2019.

Through international collaboration and the SMART project, it is possible to increase the knowledge and expertise in Albania, Montenegro and Bosnia & Herzegovina based on the more advanced EU standards on smart specialisation strategies. Also, an international network will be built up for smart specialisation, from which Albania, Bosnia & Herzegovina, Montenegro and other countries in the region will benefit. Further, SMART Innovation Centres are established in 7 universities with their missions, visions, goals, objectives, and strategic plans. Nowadays, universities initiate diverse changes in the institutional environment and actively participate in implementing such changes.

3.2   Workshop Method and Sample

3.2.1   Sample

A total of 210 staff members across seven partner HEIs participated in the training sessions, with each institution hosting at least two workshops attended by 15 staff members each. The training agenda was crafted to address the needs of academic and management staff, ensuring a broad and impactful dissemination of best practices and innovative strategies. Presented at Table 1.

In addition to the direct beneficiaries within the HEIs, the target group for this initiative extended to include students, graduates, and external stakeholders such as companies and other HEIs. This inclusive approach aimed to foster a collaborative ecosystem that bridges the gap between academia and industry, promoting a culture of continuous learning and development.

This report provides a detailed account of the workshop activities, including agendas, lists of participants, feedback forms, and activity reports. Through a thorough analysis of the data collected, we aim to evaluate the effectiveness of the training sessions and identify areas for further improvement. The findings and insights presented herein will serve as a foundation for future initiatives, ensuring sustained growth and development within our academic communities.

Table 2 Internal Workshops implemented

Proposed key achievements	Realised key achievements	Total
14 3-day internal workshops (2 per partner; 42 days in total)	• **UDG:** Two 3-day Workshops • **UES:** Six 1-day and one 2-day Workshop(s) • **UNIBL:** Two 3-day Workshops • **UNIKO:** Two 3-day Workshops • **UNISHK:** Two 3-day Workshops • **UNIVLORA:** Two 3-day Workshops • **UoM:** Two 3-day Workshops	• 6 days • 8 days • 6 days • 6 days • 6 days • 6 days • 6 days **TOTAL:** 19 Workshops over 44 days
210 staff attended to the internal workshops	• **UDG:** WS1: 57; WS2: 45 participants • **UES:** WS1: 15; WS2: 21; WS3: 20; WS4: 26; WS5 12;WS6: 19; WS7: 22 participants • **UNIBL:** WS1: 77; WS2: 67 participants • **UNIKO:** WS1: 54; WS2: 85 participants • **UNISHK:** WS1: 115; WS2: 85 • **UNIVLORA:** WS1: 60; WS2: 78 participants • **UoM:** WS1: 45; WS2: 48 participants	• 102 participants • 135 participants • 144 participants • 139 participants • 200 participants • 138 participants • 93 participants **TOTAL:** 951 participants

3.2.2　　Objectives and Expected Outcomes

Smart Specialisation is a place-based approach to innovation, conceived as a "Made in EU" concept. It has the potential to be implemented globally, fostering learning and interregional and international synergies. The approach has been implemented across European regions and member states, addressing key challenges and developing innovation policies. Best practices in Smart Specialisation include promoting sustainability, networking opportunities, providing startups with resources, and focusing on technology transfer. Effective Smart Specialisation strategies should result in projects with positive socio-economic impacts, contributing to regional challenges and fostering learning.

The SMART Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans aims to address challenges in Smart Specialization and develop innovation and entrepreneurship competencies in Higher Education Institutions (HEIs) in target countries. The project aims to introduce new learning modules and teaching approaches, support the professional development of academic staff, establish 7 SMART Innovation Centres, facilitate sustainable cooperation between HEIs and businesses through the SMART Knowledge Exchange network, encourage student and staff work placements and virtual mobility, and increase competitiveness and employability of HEIs and their graduates. The project aims to create 7 SMART Innovation Centres in AL, BiH, and MNE, focusing on smart cities, circular economy, digitalization, smart agriculture, and innovation and entrepreneurship.

The Quintuple Helix Innovation model is used to develop Smart Specialisation Initiatives in the Balkan region, focusing on national and macro-regional strategies. New databases, methods for pattern analysis, software for integrating components and sectors, and new forms of organization and governance are needed for these activities.

Focus groups were conducted in Workpackage 2 of the project to identify competencies for understanding the Quintuple Helix innovation model, recognizing the telescopic dimension of space-time, accelerating citizen participation, identifying networking needs, defining competencies for courses, and detecting sustainable habitats. The

groups also investigated awareness practices for urgent action against climate crisis, territory vulnerability, and social inequality, through the Smart Specialization Strategy localization's action plan. The model proposes co-evolution, transforming from the distribution of creative learning practices to understanding metropolitan dynamics, developing analytical tools, exploring new fields, and stimulating digital learning.

In a Smart specialization Innovation Centre, the Technology Transfer should be focused on a regional and system impact approach and can be organised in the following five macro actions:

1. The TRAINING ACTIVITIES will focus on training courses, guidance services and networking with companies for students, doctoral students and researchers on the issues of ecological transition and the enhancement of skills, also through entrepreneurship and programs reinforcing the figure of the researcher as an innovation driver.

2. The INCUBATION PROGRAMMES will work in the business idea generation stage. It starts with university students, intercepting those ideas through permanent scouting activities in the university departments and research institutes and supporting them with training, consultancy and coaching to validate idea feasibility. Matching opportunities with companies and investors will complete the programs.

3. The ACCELERATION PROGRAMMES will support businesses set up for knowledge-based spinoffs and startups based in the Region through a network of actors and initiatives, offering consultancies, mentorship, training and internationalisation services. Matching opportunities with companies and investors will complete the programs.

4. TECHNOLOGY TRANSFER actions will foster science-industry relations between regional businesses and public research organisations and universities, increasing awareness of the key strength points of the ecosystem, and working with research organisations to respond to businesses' technological needs.

5. PUBLIC ENGAGEMENT activities will focus on the engagement of citizens and civil society organisations in co-designing and monitoring research priorities and projects through Responsible Research and Innovation lenses.

These five macro actions establish a comprehensive framework for fostering innovation and entrepreneurship within the SMART Innovation Centres, ensuring that capacity building, idea incubation, acceleration, technology transfer and public engagement work in concert to deliver sustainable, regionally tailored solutions. The success of this framework laid the groundwork for the subsequent development of modular training materials described below.

3.2.3   Development of Training Materials

To support the implementation of sustainable smart specialization strategies (S3), training material was developed within work package 3 to strengthen innovation and entrepreneurship competences at partner HEIs in the Western Balkans. The process built on diverse inputs, including a comparative study on S3 (WP2.2), institutional expertise from TU Dresden's CODIP and EPC, collaboration with the COWEB project, and feedback from business support organisations and training participants. The training plan was drafted based on identified needs and refined iteratively through consultations with academic and industry partners. Activities included the development of a hybrid delivery model, templates and guidelines for training materials, topic allocation according to partner expertise, and quality assurance through peer review. Core content covered the quintuple helix model, regional cohesion strategies, the role of social innovation, local incentive frameworks, and the sustainability and management of innovation centres. The result was a modular, needs-oriented training package supporting capacity building across institutional and regional contexts.

3.2.4   Train the Trainers Concept

Within the SMART project, a structured **Train-the-Trainer approach** was implemented to ensure sustainable capacity building across the participating institutions. Following the initial centralized **capacity-building phase**, staff members who had previously been trained assumed the role of local trainers at their respective institutions. Between early and late April 2024, a total of **14 multi-day internal workshops** were conducted, typically organised as **3-day sessions**. The workshops targeted a broad audience, including

academic staff, management personnel, students, graduates, and external stakeholders from business and public sectors. The scheduling was carefully aligned with ongoing academic activities, with sessions often taking place in the afternoon hours.

The workshops combined **theoretical knowledge transfer with extensive interactive elements**. The applied formats included presentations, **moderated discussions, group work, case studies, World Café sessions, brainstorming exercises, hands-on modeling, and practical project development activities**. This multi-modal delivery ensured high levels of participant engagement and fostered practical application of the newly acquired competences. The training content was primarily based on the material developed during the **WP3.2 phase**, but was systematically **adapted to local institutional contexts**, regional development priorities, and target group needs. In several cases, materials were **translated into local languages** to ensure accessibility. Topics covered included **innovation management, entrepreneurship, smart specialization strategies, project management, intellectual property, technology transfer, 3D design, sustainable tourism, business model development, and digital transformation**.

3.2.5   Workshop Content and Application by Partner Institutions

Presentation materials—including **slide decks**, **detailed handouts** and **supplementary readings**—were **systematically localized** to reflect each SIC's thematic focus (for example, smart cities, smart agriculture, digital transformation, circular economy and entrepreneurship). In several cases, these core materials were **translated into local languages** (such as Serbian at UNIBL) to ensure full accessibility and cultural resonance. To maximize relevance, **case studies and examples** were drawn directly from regional pilot projects and each institution's strategic priorities.

Workshops combined concise **instructor-led overviews** with a suite of **participatory techniques**: World Café discussions to surface diverse viewpoints, brainstorming exercises to generate creative solutions, practical demonstrations to illustrate real-world applications, and small-group projects for hands-on practice. Facilitators continuously **encouraged peer dialogue** and **real-time problem solving**, ensuring active learning and immediate skill transfer. Between April and May 2024, partners delivered a total of

fourteen multi-day workshops—most spanning three days—carefully **aligned with academic timetables** and stakeholder availability. In all, **210 staff members** and **741 students, graduates and industry representatives** participated across **19 workshop events** covering **44 training days**. This extensive rollout demonstrates the Train-the-Trainer model's effectiveness in rapidly disseminating innovation competencies throughout the consortium.

Implementation was further customized by each of the seven SIC partners to reflect their institutional priorities and regional contexts. At **UNIBL**, modules on the local entrepreneurial ecosystem were enriched with case studies drawn from Bosnia & Herzegovina's start-up initiatives; **UDG** emphasized Montenegrin smart-agriculture pilots alongside digital-solution scenario planning; **UNISHK** integrated sustainable-tourism case studies from Albania's coastal heritage. Meanwhile, **UNIKO** tailored sessions on **smart-city** planning to address local infrastructure and urban mobility challenges; **UNIVLORA** focused on **circular-economy** models in agri-food systems, using examples of waste-to-resource processes in the Vlora region; **UES** adapted content to highlight **digital-transformation** strategies for higher-education management and e-learning platforms; and **UoM** localized modules on **advanced digital solutions** and **green-energy** management, incorporating hands-on 3D-design demonstrations and regional renewable-energy pilot data. Each partner also translated or culturally adapted key materials—ensuring both linguistic accessibility and direct relevance to their SIC's thematic specialization.

Through this **structured yet flexible design**, partner institutions successfully **localized the Quintuple Helix Model** and scaled SMART Innovation Centres' capacity-building efforts. Following these adaptations, trained facilitators served as multipliers within their HEIs—replicating workshops, disseminating materials and embedding innovation and entrepreneurship competencies across staff and student cohorts. The effectiveness of this approach—in terms of both immediate learning gains and broader capacity enhancement—is documented in the quantitative and qualitative evaluation results presented in the following chapter.

3.3 Evaluation

Quantitative Analysis

1. Evaluation Design

The evaluation of the SMART internal workshops was conducted via an anonymous, voluntary survey administered immediately after each session. A total of 261 complete responses were collected from participants across all seven SIC's between April and May 2024. These respondents comprised 210 academic and administrative staff and 741 students, graduates, and external stakeholders (industry partners and civil-society representatives) which results in a 27,45% response rate. No personal identifiers were captured, ensuring confidentiality. The survey combined Likert-style items covering logistics, content relevance, instructional quality, infrastructure and overall satisfaction; results were analyzed descriptively and visualized to highlight key trends.

2. Evaluation Analysis

Across all 19 workshop events—fourteen multi-day sessions (primarily three days each) and five shorter intensives—participants rated core organizational elements and content very positively. **Selection of the training topic** received an 87 percent "very satisfied"/"satisfied" rating, while **organization by hosts** scored 88 percent. The **social programme** and **venue conditions** (space and layout) each achieved 85 percent positive feedback, as did **technical equipment**. Communication and clarity metrics were particularly strong: 95 percent "strongly" or "somewhat agreed" that host communication was pleasant, and 92 percent affirmed the agenda's clarity.

Regarding **duration**, 59 percent found the workshop length "just right," 38 percent deemed it too long, and 3 percent too short, indicating a need for modest adjustment in session planning. For **preparation** and **task clarity**, 77 percent and 92 percent positive ratings, respectively, reflected solid alignment with participant expectations. Infrastructure elements—**technical platform** (88 percent), **audio/video quality** (89 percent) and **facilitator equipment** (91 percent)—were also well regarded. Crucially, 93

percent of respondents felt adequately supported to understand and complete assigned tasks.

When prompted for **future topics**, educators and students alike proposed areas such as **Digital Workplace**, **Intellectual Property Rights & Technology Transfer**, **Circular Economy**, **Digital Transformation** and **Regional Competitive Advantage**, underscoring shared interests across staff and student groups.

3. Impact and Conclusion

The quantitative findings demonstrate consistently high satisfaction with organization, content relevance, communication and instructional support across all SIC workshops. While workshop duration received more varied feedback, the majority of participants found it appropriate. These results set the stage for the forthcoming qualitative analysis, which will deepen the understanding of how the SMART workshops build capacity for sustainable smart specialisation. To optimize future delivery, we recommend fine-tuning session lengths, maintaining strong interactive elements and continuing to tailor content to evolving stakeholder interests.

Qualitative Analysis

I. Evaluation Design

Data for this study were collected via a standardized, categorized interview delivered as a written Google Form. This format ensured consistent wording across all questions and allowed respondents from Albania, Bosnia & Herzegovina and Montenegro to participate regardless of location (Dillman, Smyth & Christian, 2014). We invited three stakeholder groups—academic staff, administrative personnel and students—from partner universities in the Western Balkans to complete the form. Invitations, sent by email and internal posts, included a brief study description, an overview of the question categories and a link to the form. Participation was voluntary, and respondents were assured of full anonymity and confidentiality (Fowler, 2014).
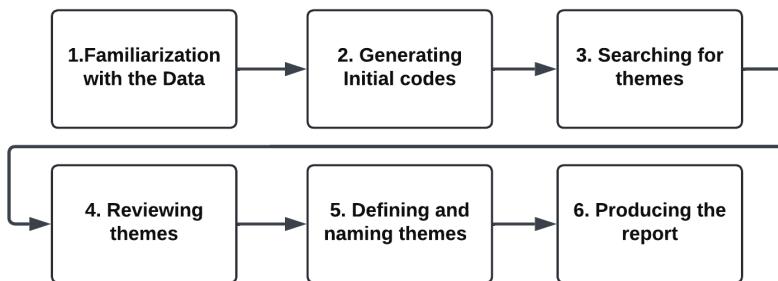
Figure 2: Thematic analysis according to Braun & Clarke (2006), (own creation)

2. Evaluation Analysis

Ten interviews have been conducted with interview partners from Albania, Montenegro, and Bosnia & Herzegovina. The following table shows the results of the thematic analysis:

Table 3 Country-specific outcome according to thematic analysis from Braun & Clarke (2006)

Question/Country	Montenegro	Bosnia and Herzegovina	Albania
Explain the Quintuple Helix model's relevance to your institution.	• Integrates academia, industry, government, civil society, environment • Fusion of interactions to foster sustainable development.	• Encompasses academia, industry, government, civil society, environment	• Comprehensive approach to innovation • Integrates educational, industrial, governmental, civil society, and environmental perspectives • Advanced framework for innovation and sustainability
Reasons for joining the SMART project?	• Unique opportunity for sustainable development, innovation • Platform for interdisciplinary collaboration.	• Increase academia's participation in innovation	• Collaborate with international partners • Aligns with professional and personal goals • Opportunity for interdisciplinary collaboration

Stakeholder responses to the SMART project?	• Overwhelmingly positive • Satisfied with goals	• Well received by stakeholders	• Positive responses • Positive tone from stakeholders • Recognize the importance of interdisciplinary collaboration
Intended outcomes from the SMART project?	• Enhanced collaboration, innovative solutions, sustainability • Foster interdisciplinary collaboration	• Produce knowledge, innovative solutions	• Strengthened collaboration, innovative solutions • Foster collaboration among multiple sectors • Produce knowledge in sustainability, digital transformation
Hurdles and opportunities in implementing the SMART project?	• Securing funding, aligning interests • Consistent funding is a major hurdle.	• Navigating regulations, stronger government partnerships	• Securing funding, navigating bureaucracy • Aligning diverse goals • Resource constraints
What is the contribution of SMART centres to regional cohesion?	• Foster collaboration, knowledge exchange • Promote interdisciplinary research	• Foster regional unity, address common challenges	• Facilitate cross-border collaboration, • knowledge exchange • Strengthen regional cohesion through collaboration

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

			• Create opportunities for cross-border initiatives
Examples of addressing all elements of the Quintuple Helix model.	• Collaborate with universities, develop solutions • Drive research and innovation	• Interdisciplinary research for societal challenges	• Research with universities • Collaborate with academic institutions • Engage in collaborative research
How can innovations drive digital and green transformations in the Balkans?	• Leverage local resources, expertise • Identify local challenges, opportunities	• Address specific regional challenges	• Develop tailored solutions for local challenges • Address specific local needs • Identify challenges, drive digital and green transformations

Commonalities: All countries recognize the importance of integrating multiple sectors (academia, industry, government, civil society, and environment) to foster sustainable development and innovation of the SMART Innovation Centers and enhance their innovation capabilities, which are set as institutional goals. Further, the stakeholder responses are mainly positive but require the collaborative effort of institutions and consortiums to attract them. The role of supportive policies and navigating regulatory landscapes is acknowledged as crucial for fostering innovation and, thus, sustainability.

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

Differences: When looking at the country-specific differences in innovation, Montenegro primarily focuses on digital innovations, while Albania focuses on digital and educational innovations. Bosnia and Herzegovina focuses on sustainability and societal well-being. The countries also faced different challenges. While Montenegro struggles with assuring funding and aligning stakeholder interests, Albania faces cultural and institutional barriers. In contrast, Bosnia and Herzegovina deals with navigating regulatory requirements.

3.4 Impact and Conclusion

The combined quantitative and qualitative analyses demonstrate that the SMART internal workshops have effectively advanced the project's objectives of fostering sustainable innovation and regional cohesion in the Western Balkans:

Quantitative, participants across all seven SICs reported uniformly high levels of satisfaction. Between 85 % and 95 % of respondents rated key dimensions—**organization by hosts** (88 %), **selection of topic** (87 %), **clarity of agenda** (92 %), and **communication quality** (95 %)—as "very satisfied" or "satisfied." Infrastructure metrics also scored strongly, with **technical equipment** at 85 %, **audio/video quality** at 89 % and the **meeting platform** at 88 % positive feedback. While **59 %** of participants found the **workshop duration** "just right," 38 % deemed it too long, highlighting an opportunity to refine session lengths in future iterations.

Qualitative, thematic analysis of ten in-depth interviews across Albania, Bosnia & Herzegovina, and Montenegro revealed broad recognition of the Quintuple Helix model's value in integrating academia, industry, government, civil society, and environmental perspectives. Stakeholders reported that SMART workshops provided unique forums for interdisciplinary collaboration, stakeholder engagement, and capacity building. Motivations for participation included advancing sustainable innovation, aligning institutional strategies with regional development goals and enhancing individual competencies through SIC-supported platforms. Despite obstacles such as resource limitations, cultural hurdles and varying innovation foci across countries,

participants noted that strategic alignment with institutional objectives and supportive policies — amplified by the Train-the-Trainer multiplier model and existing consortium networks — help to mitigate these challenges. However, the study's limited sample size and scope across the SIC consortium constrain its validity; findings should be viewed as a preliminary snapshot. A larger-scale, mixed-methods investigation is recommended to validate and extend these qualitative insights.

Together, these findings confirm that SMART internal workshops serve as a critical mechanism for translating the Quintuple Helix framework into practice. They not only deliver high participant satisfaction and actionable learning outcomes but also foster cross-sector networks that underpin long-term regional innovation capacity. To build on this success, future iterations should invest in improved technical infrastructure, refine workshop durations for optimal engagement, and leverage stakeholder feedback to tailor content to evolving local needs. Moreover, scaling quantitative evaluation and expanding interview samples will strengthen the evidence base, ensuring that SMART Innovation Centres continue to drive sustainable smart specialisation across the Western Balkans.

CHAPTER 3

Development of SMART Innovation Centers Case Study and Lesson Learned

The SMART Innovation Center
the University of Banja Luka, Faculty of Economics

The Center for Digital Innovations (CDI)
The Faculty of Electrical Engineering University of East Sarajevo, BiH

SMART CITY HUB
University of Vlora (UNIVLORA)

The SMART Business Hub
University of Shkodër "Luigj Gurakuqi" (UNISHK)

"Fan S. Noli" University – SMART INNOVATION CENTER

UDG SMART Innovation Center

SMART Innovation Center for 3D Printing,
University of Montenegro

4. Development of SMART Innovation Centers – Case Study and Lesson Learned

SMART Innovation Centres function as hubs that operationalize S3 principles and facilitate entrepreneurship and innovation capacity building in the Western Balkans by:

- **Providing physical and virtual spaces** where innovators can collaborate, access expertise, and prototype solutions.
- **Delivering tailored training programs** focused on sustainable innovation, digital skills, and business development.
- **Linking academia, industry, and public sector** to foster an ecosystem conducive to knowledge exchange and commercialization.
- **Supporting participation in regional and EU-wide competitions** like the SMART Innovation Challenge, enabling young innovators to validate and scale their ideas.
- **Promoting cross-border cooperation** by connecting local ecosystems with broader Western Balkans innovation networks.

Impact and Academic Evidence

Studies demonstrate that Innovation Centres significantly enhance regional innovation outputs, startup creation, and entrepreneurial competencies (World Bank, 2022; OECD, 2023). In the Western Balkans, SMART Innovation Centres have contributed to:

- Increased awareness and engagement in innovation-driven entrepreneurship.
- Capacity building through mentorship and hands-on project development.
- Creation of sustainable solutions

The development of Smart Innovation Centers within SMART project play an essential role in addressing the challenges faced by the CE region. In addition to the regional and socio-economic disparities, the **need for fact-based cluster policies**, and the lack of guidelines for transitional clusters, there is also a need to prioritise the involvement of young generations in economic development. By establishing Smart Innovation Centers, the CE region can provide a platform for young generations to engage in innovation and entrepreneurship, which can contribute to the transformation of economic activities

SMART

Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans

towards a Circular Economy. Furthermore, the Centers facilitate **collaborations between local and foreign actors**, and support the creation of transitional clusters with a distribution of actors at different stages of the value chain. With the support of Smart Innovation Centers, the region can expand the "smart city" model to the entire regional territory and transform the blue growth, tourism, and agriculture sectors for a more sustainable and competitive future.

Passing to the **possible Innovation centre scheme and communication**, the key factors that should be considered when structuring a new research pole should be: specificity, unicity, non-overlapping, and opportunities. One of the most interesting policies that should be followed in the definition of the new Innovation centres scheme is the **Open Innovation** initiative, which includes some mapping activities, aimed at integrating local initiatives in a systematic representation through a specific network and/or platform. This can significantly help the match-making of Demand and Supply of research abilities and opportunities and innovation needs. Another fundamental factor that emerges not only from EU policies, but also from case studies and Focus Groups results is the need for **cooperation**, to create a community of innovators and innovative activities, starting from specific and place-based SDGs and their effects on the local ecosystem.

Creating a new **Innovation centre** also means that duplicate poles should be avoided in the local network, to promote the existing resources in the light of a more sustainable development. This should pass from a set of portfolios of possible innovative solutions to local territorial challenges. Creating a network of **competitive cooperation** can be significantly positive for the research developments, as for the COVID19 vaccine development, that is an interesting example of how sharing information led to fast results, inducing a significant leap in medical research, that will improve many other research programmes in the next decade.

Another significant element is the **monitoring** and the attention that is dedicated to specific topics, that should preferably always be high, so that research can continue to develop significant findings. That is why a **Technology transfer and innovation program** should is planned together with the new Innovation centres (including vertical - technology transfer, incubation, acceleration, monitoring, scouting - and horizontal - training, networking, cooperation, public engagement - actions). This can help understand how research can be integrated in its impact on communities and territories,

including public engagement strategies. It is very important to create a community of research and innovation entities that can **develop an innovative ecosystem**, being physically present and integrated in the different contexts, which is the actual meaning of 'place-based'. This will also help research and transformative innovation to 'get to the ground' and develop real effects and impacts in the local production sectors.

We can't forget about the **cooperation and socialisation factors**, as networking, engagement, community creation, are fundamental, together with legal, fiscal, economic and financial services, plus soft and digi-skills, that can be a very important educational moment for the entire community. An Innovation centre should actually **address businesses that do not know how or can't make research autonomously** for many possible motivations (not only their size, or resources, but also considering skills and time), pushing towards a technology transition to all and for all. This will help **share the culture of innovation** in the local community and society, involving different stakeholders and public entities, and create the necessary conditions to an **inclusive and diffusive technological integration**.

An Innovation centre can even become a **Social hub**, a place where the needs of businesses and workers are collected, but also opportunities of education, discussion, sharing and social innovation are promoted. This can be integrated with acceptance raising and scouting initiatives, or even knowledge/know-how/expertise sharing events, but also investment opportunities, fund raising options and public procurement chances, possibly through a **match-making program**. This could help reduce the gap between Universities, Research entities and businesses, **turning territories from research receivers to innovation drivers**, programmers and developers, as in some citizen science examples.

4.1 SMART INNOVATION CENTERS IN BOSNIA AND HERZEGOVINA

4.1.1 The SMART Innovation Center at the University of Banja Luka, Faculty of Economics

Since the launch of the Erasmus+ SMART project in December 2022, the SMART Innovation Center at the University of Banja Luka - Faculty of Economics has been dedicated to strengthening innovation and entrepreneurial capacity across the city and region. An overview of our most significant accomplishments follows, along with the strategic initiatives planned for upcoming years.

At its very inception, between December 2022 and May 2023, SMART Innovation Center was established as a sub-unit to the Faculty of Economics, University of Banja Luka and was afterwards fully equipped with necessary technical and other equipment. An 86" interactive display was installed, along with the video-conferencing system, workstations, and supporting IT infrastructure. A governing board and an operational team comprised of experts from both the Faculty of Economics and Faculty of Mechanical Engineering were appointed, and later partnerships were forged with local chambers of commerce and private companies to ensure the center has laid the groundwork for future collaboration.

Starting June 2023 up until 2025, a series of workshops and seminars were organised at the Center, mostly revolving around smart specialisation, design thinking, and business model innovation. These workshops were oriented towards university staff, students, industry but all other interested parties. Those oriented towards university staff included the workshop revolving around multi-helix models, but also one discussing the role of agile management in smart specialisation strategies and vice versa. Afterwards, several training sessions for SMART project staff followed, such as one in Vlora, where a lot was discussed about sustainable innovation, supply chains and digital transformation, featuring partner universities and organisations within the project.

In September 2023, the University of Banja Luka and our SMART Innovation Center hosted the regional SMART meeting within the project. This meeting was attended by the

representatives of 14 partner institutions from Albania, Bosnia and Herzegovina, Italy, Germany, Slovenia and Montenegro.

In April 2024, SMART Innovation Center at the Faculty issued a call inviting second- to fourth-year undergraduates and master students to join the SMART project. Selected students engaged in hands-on training, contributed very well to center activities, and visited a partner innovation center in Korce, Albania. Candidates were evaluated on academic performance, English proficiency, and motivation. Our students have been active ever since.

The center also organised a mini-event (s.c. mini-placement) portraying the center's formal physical setup. The purpose of the event was to assess and test the acquired equipment for the needs of the Innovation Centre.

Soon after, our center was visited by students from the partner University of Montenegro. This happened during the miniplacement, held in December 2024 and encompassed a three-day exchange focused on Smart Specialisation strategies. Over these three days, the students were warmly welcomed by their fellow colleagues, university staff, and SMART team members. During the visit, they engaged in lectures, discussions, field and conference visits aimed at bridging academic knowledge with real-world practices.

Several other workshops were held during the period December 2024 to June 2025. Among other things, SMART project was again presented to interested parties at the Conference of Science which was held on the occasion of the 50th anniversary of the Faculty of Economics.

Workshop, counselling sessions, and training sessions were held regarding the Smart Student Idea Competition. These activities managed to bring more than 50 interested student applicants for the competition and resulted in 5 interdisciplinary teams forming and formally applying their ideas for the competition.

The center was designed and planned to be self-sustainable in mid-term outlook where it would organise and offer several different types of activities, mostly comprised of counselling and advisory services.

Trainings will continuously be held, whether through seminars, webinars or workshops. The center will provide trainings for students, staff and other beneficiaries within the University of Banja Luka, but also for external parties.

Later on, incubation programs are planned to set off. Through these programs, firstly university students and then all other interested beneficiaries, will be able to seek and receive support, counseling and mentoring — all in the process of generating a successful business idea.

Following the incubation programs, acceleration programs are also set to take off within the center, and these will support the establishment of businesses through a network of partners, offering mentoring, training, consultations, and even possible financial resources from donors and other projects.

Finally, the self-sustainability of the center will reflect in successfully launching full scale consultancy and advisory services offered to externals, mostly businesses from various sectors, with a special focus on businesses from priority sectors identified in the drafted S3 strategy.

Success story and Lesson Learned

Spring 2025 marked a milestone for the SMART Innovation Center at the Faculty of Economics - University of Banja Luka, with the launch of the inaugural project-wide SMART Student Competition, a platform designed to stimulate creative problem-solving among interdisciplinary students teams.

The competition unfolded over three distinct phases:

a) Call for proposals and team formation

A university-wide announcement invited bachelor and master students from economics, engineering, IT, and all related fields to form 3-5 member teams. To ensure diversity of perspectives, even though it was not required, our students team formed mostly interdisciplinary teams study-field related. The applicants were of various backgrounds, including law, architecture, biology, chemistry, and economics students. Prior to team formation, several workshops were held.

b) S3 presentations and workshops

Firstly, a brief presentation overviewing the basics of the S3 concept was held. All interested students were invited to attend the presentation with the goal of understanding the focus of the student competition – Smart Specialisation.

Afterwards, our SMART team organised a workshop with a similar topic, aimed, again, at those interested in applying for the competition. Our team members went through business idea generation stages, S3 principles and concepts, and eventually through pitching techniques. This was all done through an interactive example. A big majority of students who attended showed active participation in the workshop. From that point on, it was clear that this competition, with all its phases truly deserves to be told within the Success story chapter of this publication.

c) Final pitch and award ceremony

Teams from both University of Banja Luka and University of East Sarajevo gathered and presented 5-minute pitches before a jury panel comprising representatives from UNIBL, UES, and the Chamber of Commerce of the Republic of Srpska.

Evaluation criteria emphasized originality, feasibility, social impact, smart specialisation, and sustainability.

The three teams received awards were as follows:

- 1st place was awarded to an interdisciplinary team from the University of Banja Luka - Faculty of Economics and the Faculty of Architecture, Civil Engineering and Geodesy.
- 2nd place was awarded to a team from the University of East Sarajevo, Faculty of Electrical Engineering.
- 3rd place to a mixed team from the University of Banja Luka, comprising of students from several faculties.

All teams were appropriately rewarded. The winning team has well started preparing for the regional contest to be held during the Final Conference of the project in Podgorica, Montenegro in October 2025. Several counselling sessions were held with the winning team after the competition, including those facilitated by SMART team members, but also industry professionals and others.

These achievements underscore why the SMART Student Competition stood out at our center as our success story. It exemplifies University of Banja Luka's and center's ability to transform interdisciplinary concepts into measurable societal and economic benefits, reflecting the very mission of the center. Through the competition, a lot has been learned: how to nurture teamwork, how to offer but also receive quality mentorship, and finally – how to implement all of this practically.

This competition demonstrated how our students in cohesion with the center, at its initial phases, can help bridge academic excellence and real-world applicative entrepreneurship.

SMART | UNIBL Smart Innovation Center
University of Banja Luka

Mission:
To support the establishment of an innovative ecosystem that contributes to the development of competencies for innovation and entrepreneurship, promotes smart specialization and thereby contributes to the development of a knowledge-based economy.

Vision:
To be distinguished locally and regionally for supporting innovators and entrepreneurs to achieve sustainable development and promote knowledge economy.

Key activities:

Trainings

Incubation programs

Acceleration programmes

Consultancy and advisory services

Promotional activities

Contact Person:

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Project No. 101082938 – SMART – ERASMUS-EDU-2022-CBHE

Figure 3: Contact Information SMART Innovation Center UBL

4.1.2 The Center for Digital Innovations (CDi) – The Faculty of Electrical Engineering University of East Sarajevo

The Center for Digital Innovations (CDI) was founded within the SMART project framework at the Faculty of Electrical Engineering, University of East Sarajevo, with the mission of fostering digital transformation in agriculture and rural development. By combining research, education, and industry collaboration, the Center aims to support small farmers, agribusinesses, and local communities in adopting innovative and sustainable digital tools. The Center also engages students and academic staff in practical projects, creating a bridge between higher education and real-world application.

This report presents an overview of CDI's activities, including counselling and training sessions, prototype development, research achievements, collaboration with industry, challenges faced, and plans for future activities.

Success story and Lesson Learned

In 2023–2025, the CDI implemented a diverse set of activities. A brief overview is given below:
- Advisory and training sessions: Ten thematic sessions addressing digital tools in agriculture, sustainability, agritourism, and product traceability.
- Prototype development: Creation of a greenhouse monitoring and control system and a GPS-based livestock tracking system.
- Technology transfer: Cooperation with a local company located at the Faculty of Electrical Engineering, which continued developing and commercializing CDI prototypes, providing practical work and scholarships for students.
- Research results: Publications in journals and conferences, development of optimization tools for animal nutrition, and multi-criteria ranking methods for fruit species.
- Community building: Establishment of a sustainable innovation community that connects students, farmers, businesses, and researchers.

Detailed Description of Counselling Sessions

The counselling sessions represented a cornerstone of CDI's outreach activities. Each session was designed to respond to specific challenges of farmers, agribusinesses, and students. Basic information about the counselling sessions is provided below.

o Precision Agriculture Tools Workshop – Format: On-site workshop; Focus: Demonstration of sensors, drones, and data platforms for yield optimization; Outcome: 15 farmers trained, 3 pilot projects initiated.

o IoT Applications in Livestock Management – Format: On-site with live demonstrations; Focus: GPS and IoT tracking of livestock health and movement; Outcome: 5 devices installed on pilot farm, generating valuable field data.

o Sustainable Agritourism Development – Format: Online seminar; Focus: Integration of digital booking, promotion, and marketing tools for rural tourism; Outcome: 10 participants upgraded their websites and social media presence.

o Product Traceability with QR Codes – Format: Hybrid; Focus: Introduction of QR codes for transparent supply chains; Outcome: Pilot project for one honey producer, interest from dairy sector.

o Data Management for Small Farms – Format: Interactive workshop; Focus: Use of cloud-based farm management software; Outcome: 8 farms registered for trial use.

o Energy Efficiency in Agriculture – Format: On-site seminar; Focus: Renewable energy and cost reduction strategies in greenhouses; Outcome: Technical guidelines distributed to 12 participants.

o Hackathon Preparation Session for Students – Format: Mentorship workshop; Focus: Supporting student teams in problem definition and prototype design;

Outcome: 2 student teams established, projects later presented at faculty events.

o Sustainable Pest Control Practices – Format: Practical demonstration; Focus: Environmentally friendly pest management technologies; Outcome: Adopted by 3 orchards, reduced pesticide use.

o Water Resource Optimization with IoT – Format: On-site demo; Focus: Low-cost soil moisture sensors and irrigation automation; Outcome: One pilot farmer reduced water usage by 25% while maintaining yield.

o Digital Marketing for Rural Products – Format: Workshop; Focus: Social media, e-commerce, and branding for small producers; Outcome: Participants reported 20–30% growth in online engagement and sales.

Technology Development and Industry Collaboration

A major achievement of CDI was the development of two innovative prototypes:

- Greenhouse monitoring and control system: An IoT solution that integrates sensors and actuators to optimize greenhouse climate, energy usage, and plant health.
- GPS-based livestock tracking system: Designed for monitoring cattle in extremely rural areas, improving both efficiency and animal welfare.

Both prototypes were transferred to a local company located at the Faculty of Electrical Engineering. The company has continued development and commercialization, while also providing student practice and funding scholarships for students, who are directly involved in the development, testing and deployment. This ensures both knowledge transfer and practical experience for young professionals.

Additional Results of the Center

Apart from the training and counselling sessions, CDI achieved the following:

- Research results: Software tool for optimization of dairy rations and feed mixtures; Multi-criteria ranking software tool for fruit species; Published papers in conferences and journals focusing on smart agriculture and digitalization.
- Projects and events: Participation in SMART project activities; Presentation of solutions at regional innovation fairs; Engagement in EU-focused collaboration networks.
- Educational outcomes: Student involvement in applied projects; Development of case studies showcasing practical application of digital tools.

Good Practices and Success Stories

Several good practices emerged from CDI's work:
- Farmers applying IoT irrigation systems reduced water consumption by 25%.
- A honey producer successfully adopted a QR-based traceability solution, which attracted new buyers.
- Students received scholarships and practical training through collaboration with industry.
- Agritourism operators improved digital visibility after workshops.

These examples highlight the practical value of CDI services and their contribution to both economic and environmental sustainability.

Challenges and Barriers

The main challenges observed include:

- Limited digital literacy in rural areas.
- Infrastructure gaps, especially poor internet coverage.
- Skepticism and resistance to technology adoption.
- Financial barriers for scaling pilot solutions.
- Limited human resources engaged in CDI activities.

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Sustainable Smart Solutions in the Western Balkans

Future Plans and Recommendations

Based on feedback received from the users and experience from conducted activities, CDI will:

- Work on engagement of additional researchers and students in its activities,
- Expand consulting services to cover specialized issues (IoT water optimization, sustainable pest control).
- Diversify delivery formats: on-site workshops, online seminars, demonstrations.
- Strengthen the sustainable innovation community with clear moderation, participation incentives, and regular events.
- Develop case studies and concrete outputs (adoption metrics, success stories).
- Organize an annual Agri-Tech Networking Day to connect farmers with technology providers.

The Center for Digital Innovations has become a recognized hub for digital transformation in agriculture in Bosnia and Herzegovina. By combining training, prototyping, research, and industry partnerships, CDI has built a strong foundation for long-term impact. Its focus on empowering small farmers, engaging students, and promoting sustainable practices ensures its relevance and importance in the years ahead.

SMART | Center for digital innovations University of East Sarajevo

Mission:
To empower small farmers through accessible digital innovations developed in collaboration with students and teaching staff.

Vision:
To create a future where every small farmer has access to affordable and user-friendly digital tools, enhancing productivity and sustainability in agriculture.

Key activities:

Research and Development: Conducting research to identify the specific needs and challenges faced by small farmers. Developing innovative digital solutions and data analytics platforms tailored to their requirements.

Education and Training: Integrating digital agriculture concepts into the curriculum, organizing workshops, seminars, and training programs on the application of digital technology in agriculture.

Collaborative Projects: Partnering with agricultural organizations, NGOs, and local community to implement pilot projects in collaboration with small farmers, while also providing valuable learning opportunities for students.

Technology Transfer: Facilitating the adoption of digital technology by small farmers through training programs, user-friendly manuals, and technical support services.

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Figure 4: Contact Information CDI UES

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Sustainable Smart Solutions in the Western Balkans

4.2 The SMART Innovation Centres in ALBANIA

The main objective of this phase is to highlight the concrete results achieved through the Hub's ongoing work and to identify best practice examples that demonstrate meaningful impact.

4.2.1 SMART CITY HUB at the University of Vlora (UNIVLORA)

This study examines the feasibility of establishing a SMART CITY HUB at the University of Vlora (UNIVLORA), with the objective of positioning the university as a regional driver of innovation, sustainable development, and digital transformation. The research investigates the institutional, technical, economic, and socio-environmental dimensions of the proposed hub, employing a mixed-methods approach that includes stakeholder interviews, SWOT analysis, infrastructure assessment, and funding landscape review.

Findings indicate that UNIVLORA possesses significant potential to serve as a nucleus for smart city initiatives, owing to its interdisciplinary academic resources, existing ICT infrastructure, and strategic urban location. The study identifies key areas of focus for the hub, including smart tourism, smart mobility , digital governance, and data analytics. Furthermore, the analysis highlights viable funding opportunities through national innovation schemes and European Union programs such as Horizon Europe and IPA III.

The study identifies that the SMART CITY HUB is feasible and aligns with both local development priorities and broader regional innovation strategies. Its implementation would not only enhance the university's research and educational capacity but also foster collaboration between academia, industry, and local government in addressing urban challenges through smart and sustainable solutions.

Strategic development of SMART City HUB

Cities have historically played a crucial role in driving innovation, economic development and social change , and their influence is only destined to grow, as rapid urbanization continues across the world regions. As of 2023, urban areas hosted 57% of the world's population, but this percentage is predicted to increase to 68% by 2050. As a result, municipalities worldwide are now confronted with several societal and environmental challenges, including (but not limited to) overcrowding, traffic congestion, pollution, and growing socio-economic inequalities.

Digital transformation has the potential to address and mitigate these challenges, by enabling the integration of digital technologies into all aspects of urban life . Consequently, cities are among the actors contributing the most to driving the global spending on digital transformation, which reached USD 1.85 trillion in 2022 and is expected to double by 2027, with the market of smart city technologies forecast to grow even faster, from USD 121 billion to USD 301 billion between 2023 and 2032 .

Mission

The UNIVLORA Smart Innovation Center is envisioned as a state-of-the-art technology and human resource infrastructure that creates an innovation ecosystem for sustainable smart specialisation and related innovation & entrepreneurship competence development.

Its **mission** is to fully achieve the objectives of SMART project.

Objectives of Smart Innovation Center

Goal: to simulate innovation & entrepreneurship competence development with introduction of new smart specialization - related learning modules and teaching approaches into HEIs' curricula.

The Innovation Center to make a sustainable impact must be situated firmly within local needs and the local context of the partner universities of SMART project, but able to fully comply and understand each other's dynamics in order to achieve the following **objectives**:

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Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

- Exchange network;
- Regional cohesion;
- Smart specialization awareness and development;
- Human resources capacity building;
- Business and University stronger partnership and collaboration in the field of innovation and smart specialization.

SMART CITY HUB engagement in defining local needs and perception on smart city development in the Region of Vlora.

In this extent, the main objective is to present the efforts done in terms of smart city development in the Region of Vlora, and the role of SMART CITY HUB. How this is perceived by the residents of Vlora? Is the population ready to understand the concept and the advantages of smart cities, and moreover to use smart city services?

The most broadly accepted model of the smart city considers six key "smart" dimensions: economy, mobility, environment, people, education, and governance (Cohen, 2013). The smart city purports to support "smart people" by encouraging participation, inclusiveness, and creativity. "Smart people" values include plural participation and openmindedness. In the smart city, "smart people" are engaged in "smart governance," which involves strengthening connections, interactions, and governance partnerships among city government and stakeholders, including citizens and civil society.

The current study considers the extent to which UNIVLORA Smart City Hub is realizing these smart city aspirations. Jacobson and Choi (2008) argued that the more aware citizens are of public projects, the more likely they will be to engage in providing useful input and feedback for service production and delivery.

They suggested public workshops, open forums, community meetings, and press conferences as strategies to better educate and engage citizens in proposed public services. The smart city should reflect citizens' needs and views on the rationale for a smart city, thus providing incentives for usage, participation, and feedback for its services. Smart cities should respect citizens-asservice-users who can provide useful input and feedback on the public-private partnerships that underpin the KKSC approach, particularly as they are directly affected by the quality of these services (Jacobson & Choi 2008; Perng, 2018; Veselitskaya et al., 2019).

Methodology

This study conducted by SMART City Hub team and students of Business Department, University of Vlora, considers citizen awareness of the smart city concept by assessing citizen responses to a central, straightforward question: "Have you ever heard about smart cities?" The extent of citizen smart city knowledge and awareness was further assessed by posing two additional questions: "Do you know what constitutes a smart city?" Those who answered "yes" were also asked, "What are the components of a smart city?"

1. A e keni dëgjuar ndonjëherë termin "qytet i zgjuar"?
25 responses

● Po
● Jo

96%
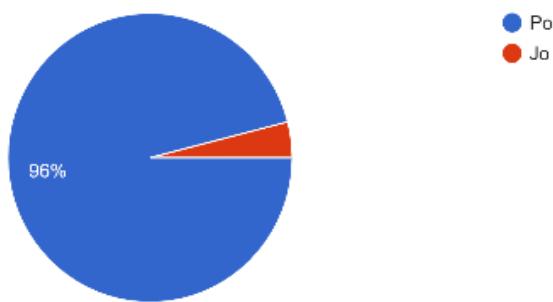
Figure 5: Question: Have you ever heard about smart cities?

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2. Si do ta vlerësonit njohurinë tuaj për konceptet dhe shërbimet e qytetit të zgjuar?
25 responses

- Pa njohuri fare Njohuri të shkëlqyera
- Njohuri të kufizuara
- Njohuri mesatare
- Njohuri të mira
- Njohuri të shkëlqyera
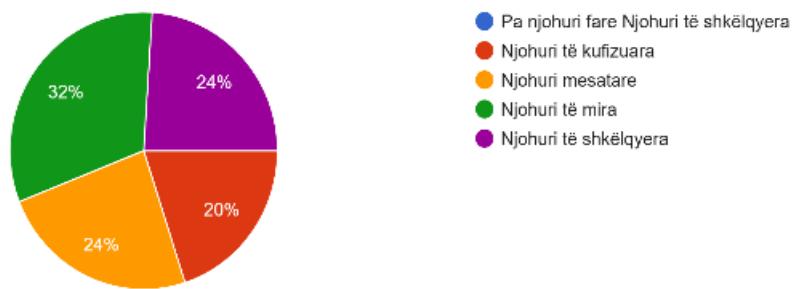
Figure 6: What are the components of a smart city?"

3. Cila përshkrim përshkruan më mirë një qytet të zgjuar? (Zgjidhni një)
25 responses

- Qytet me ndërtesa/infrastrukturë të avancuar
- Qytet që përdor teknologji për të përmirësuar shërbimet
- Qytet i fokusuar në qëndrueshmëri mjedisore
- Nuk jam i/e sigurt
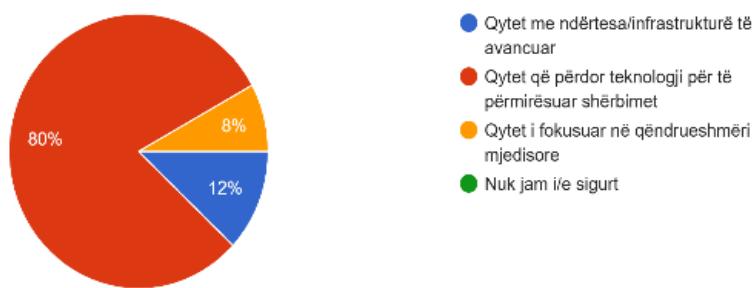
4. Cilat nga këto shërbime të qytetit të zgjuar i njihni në qytetin tuaj? (Zgjidhni të gjitha që vlejnë)
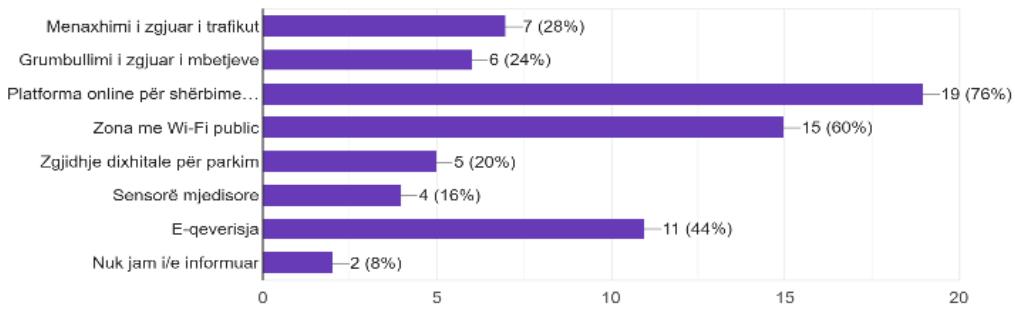
25 responses

Në çfarë mase pajtoheni me deklaratat e mëposhtme? (Shkalla Likert 5-pikëshe)

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Sustainable Smart Solutions in the Western Balkans
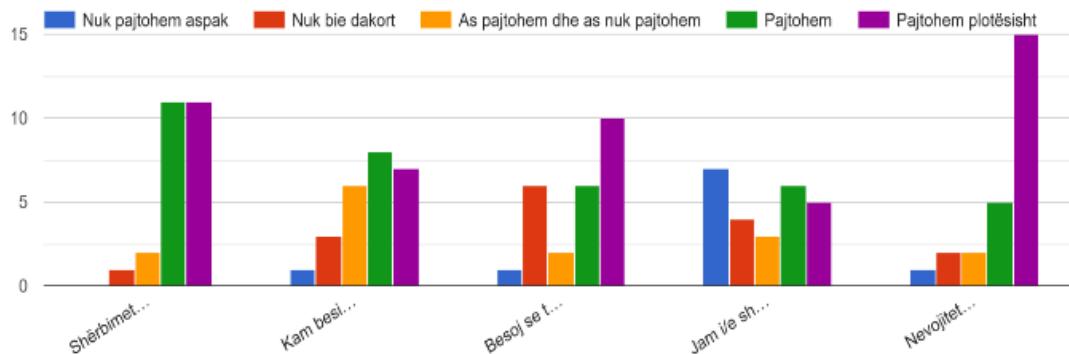
6. Cilat janë përfitimet kryesore të një qyteti të zgjuar? (Zgjidhni deri në 3)

25 responses

Kategoria	Vlera
Ofrimi më i mirë i shërbimeve publike	22 (88%)
Qëndrueshmëri mjedisore	7 (28%)
Ulje e bllokimeve	5 (20%)
Transparenca qeveritare	9 (36%)
Rritje ekonomike	17 (68%)
Përfshirje më e madhe e qytetarëve	12 (48%)
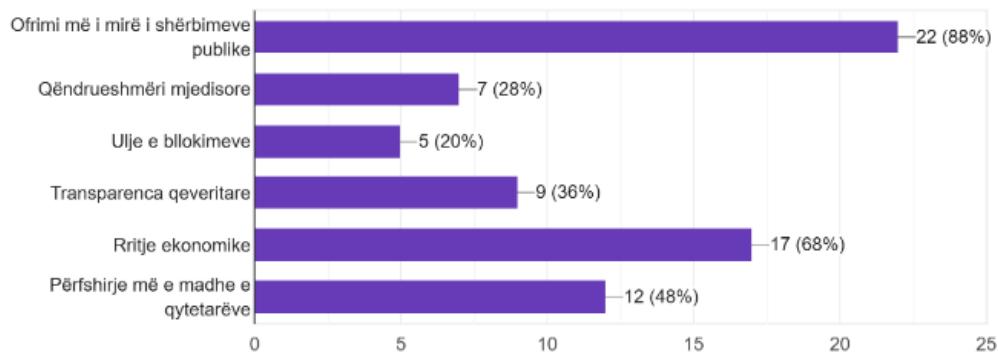
7. Cilat janë shqetësimet tuaja kryesore? (Zgjidhni të gjitha që vlejnë)

25 responses

Kategoria	Vlera
Privatësia	12 (48%)
Dështime teknike	14 (56%)
Mungesa e përfshirjes publike	12 (48%)
Kostot e zbatimit	10 (40%)
Përjashtimi teknologjik	8 (32%)
Nuk kam shqetësime	2 (8%)
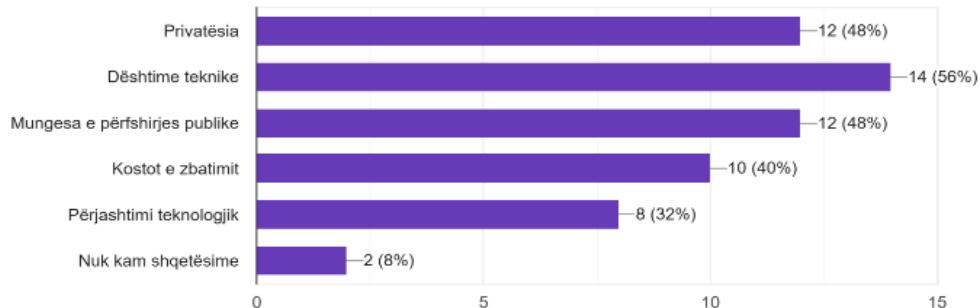
8. A keni përdorur ndonjëherë shërbime të qytetit të zgjuar?

25 responses

- Po
- Jo

48%

52%
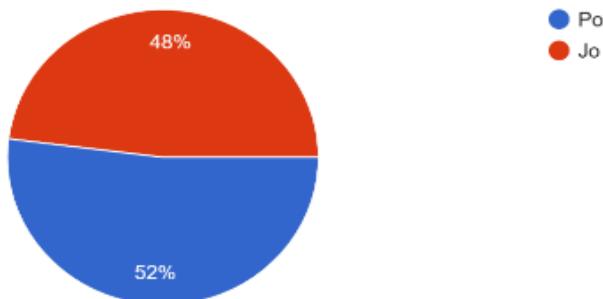
9. Sa të gatshëm jeni të mbështesni zhvillimin e mëtejshëm në Vlorë?

25 responses

- Fare i/e papërgatitur
- I/e papërgatitur
- Neutral
- I/e përgatitur
- Plotësisht i/e përgatitur

60%

8%

8%

24%
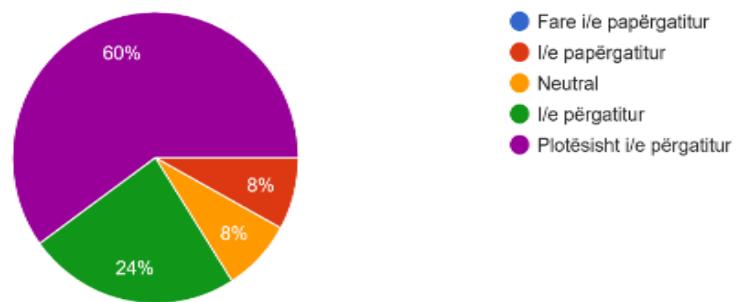
10. Në cilat fusha duhet të prioritizohen teknologjitë e zgjuara? (Zgjidhni deri në 3)
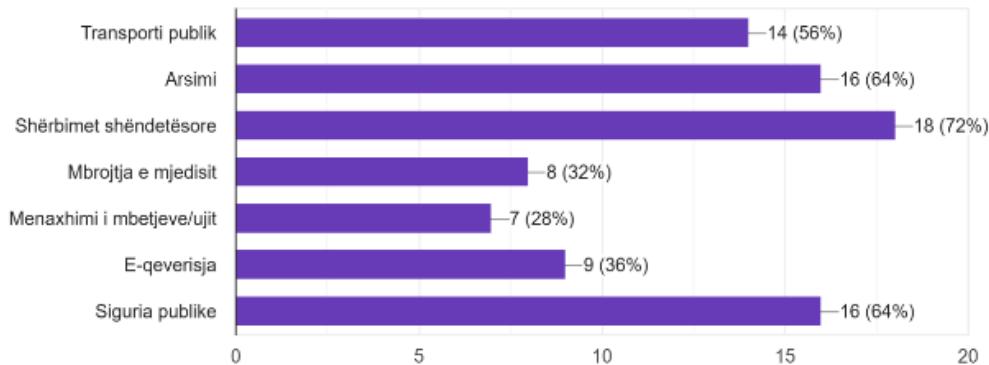
25 responses

Demographic data of respondents

11. Mosha juaj?

24 responses

12. Gjinia:

25 responses

- ● Mashkull
- ● Femër
- ● Jo-binare
- ● Preferoj të mos e them
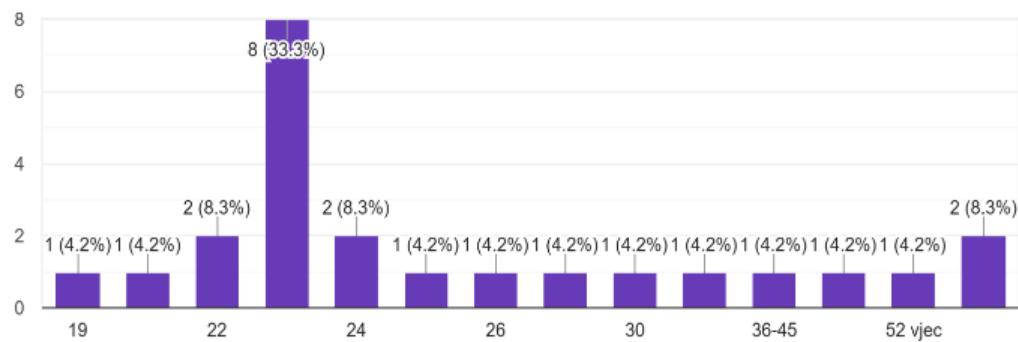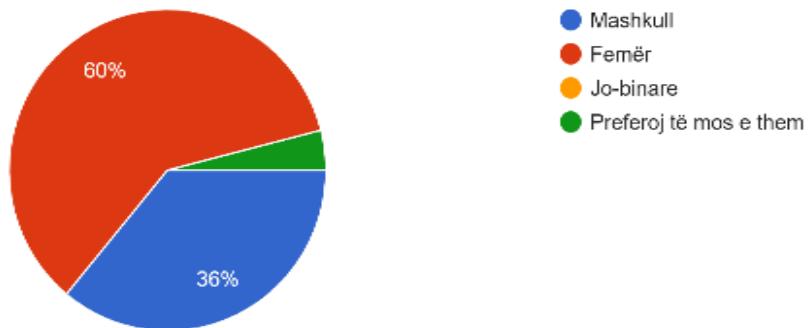
Statusi i punësimit:

24 responses

- ● Me kohë të plotë
- ● Me kohë të pjesshme
- ● Vetëpunësuar
- ● Student
- ● I/e papunë
- ● I/e pensionuar
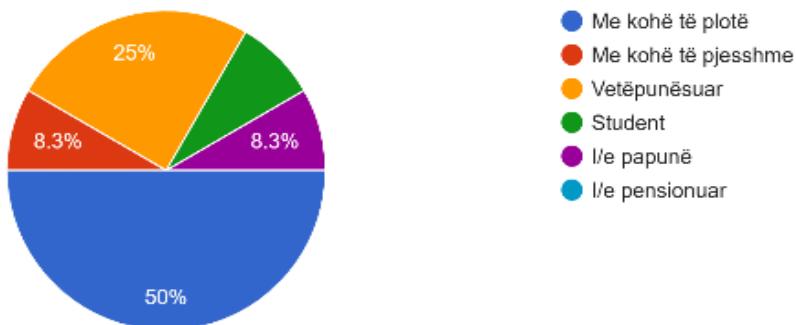
13. Niveli arsimor:

25 responses
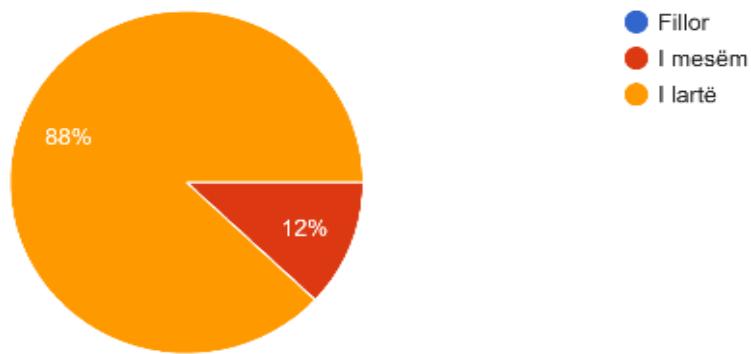
- Fillor
- I mesëm
- I lartë

15. Kohëzgjatja juaj në qytetin e Vlorës:

25 responses
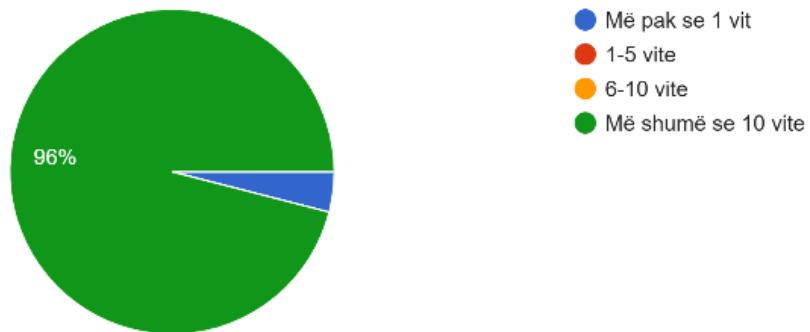
- Më pak se 1 vit
- 1-5 vite
- 6-10 vite
- Më shumë se 10 vite

Primary data were collected through semi-structured interviews conducted during June 2025. A random sample of Vlora citizens was used.

Results

The results of the interviews with the 100 respondents are divided into subsections. The first provides a description of the characteristics of the process. The second offers a general picture of the level of citizen awareness of smart cities. The third shows the level of citizen knowledge of smart cities.

Awareness of Smart Cities

Survey respondents demonstrated a low level of awareness about smart cities. The question for awareness was, "Have you ever heard of the term 'smart city'?"

Knowledge of Smart Cities

In the current study, the meaning of knowledge as compared to that of awareness focuses on information that respondents have acquired from any source, including personal experience, media sources, other persons, and the organizations responsible for planning and implementing KKSC. In the analysis of respondent knowledge of one or more components of smart cities, it was found that respondents' knowledge of smart cities was, as with the awareness dimension, low.

Discussion and Conclusion

The survey found that the level of awareness and knowledge of smart cities among the citizens of the Vlora municipality was low. Even though the plan to transform Vlora into a smart city represents a politically bottom-up approach that involve policy support from the central government, it does not recognize the significance of local citizen engagement, likely resulting in the evidence of low citizen awareness and knowledge found in this study.

Recommendation

Based on the results of the study, it is very crucial to start a process of raising awareness on the importance that smart city development has on urban development and quality of life of residents.

University has a great role on this process through deep analysis, consultancy services, networking and local governance training public officials and citizens awareness and knowledge. An evidence of that is the Smart City Hub Innovation Center at the University of Vlora, that offers all these kind of services as an important effort to contribute to the innovative urban development at the city of Vlora.

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

SMART CITY HUB
University of Vlora "Ismail Qemali"

Mission:
The UNIVLORA Smart Innovation Center is envisioned as a state-of-the-art technology and human resource infrastructure that creates an innovation ecosystem for sustainable smart specialisation and related competence development.

Vision:
To become a primary actor in the Innovative development of the whole region of Vlora, as the Quintuple Helix Model suggests.

Key activities:

TRAINING ACTIVITIES will focus on training courses, to build and reinforce innovation and digital skills.

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Figure 7: Contact Information SMART CITY HUB UNIVLORA

4.2.2 The SMART Business Hub at the University of Shkodër "Luigj Gurakuqi" (UNISHK)

In cooperation with its liaison partner, UNISHK is selecting initiatives that reflect successful approaches to regional development—ranging from increased awareness of smart specialization priorities to the stimulation of entrepreneurial and innovation capacities. These selected cases will be featured in a joint publication that brings together practical experiences and academic insights on sustainable smart specialization and innovation-driven growth in the Western Balkans. Through its continued engagement, the SMART Business Hub at UNISHK serves as a vital contributor to knowledge exchange, institutional capacity building, and the development of forward-looking economic ecosystems in the region

The SMART Business Hub at the University of Shkodër "Luigj Gurakuqi" (UNISHK), has developed into a dynamic platform for fostering innovation, entrepreneurship, and regional cooperation. Functioning as part of the SMART project, the SMART Business Hub has played a key role in promoting smart specialization by offering targeted counselling, mentoring, and training activities tailored to the needs of students, start-ups, and local stakeholders.

Success Stories and Lesson Learned

1. SMART IDEA – Sharing Best Experiences" Training Session

Date: February 26, 2025

Location: SMART Business Hub, University of Shkodra "Luigj Gurakuqi" (UNISHK)

Key Aspects Highlighting Best Practice

- **Promotion of Smart Specialisation:** Through the SMART Innovation Challenge, participants were guided to develop project ideas aligned with regional needs and sustainable development goals, directly supporting smart specialisation initiatives in the Western Balkans.

- **Empowerment through Peer Learning:** The interactive format encouraged active participation, group discussions, and networking, creating a collaborative ecosystem that supports long-term innovation and entrepreneurial growth.
- **Expert-Led Practical Training:** The inclusion of experienced trainers and mentors (Mirza Berdica, Besar Berdica, Elton Shpuza) ensured professional guidance for participants, enhancing the quality and feasibility of project ideas developed during and after the session.
- **Tangible Outputs:** The session led to increased awareness of entrepreneurship opportunities, concrete mentorship connections, and prepared participants to engage directly in the SMART Innovation Challenge.

Impact on Regional Development:

By equipping young innovators with the skills, resources, and mentorship needed to address local and regional challenges through innovative projects, this training contributes to building a sustainable, knowledge-based economy in the region. It also enhances the entrepreneurial culture necessary for smart specialisation strategies to succeed in Albania and the Western Balkans.

Criteria for Selection of the Best Practice

Justification for Selection:

This training session represents the best practice example due to its measurable impact on fostering entrepreneurial skills, innovative thinking, and sustainable project development among students and young entrepreneurs. Organized in collaboration with the SMART Business Hub, the Department of Business Administration, and expert trainers, the session successfully bridged theoretical knowledge with practical application, contributing directly to regional development goals The selection of the "SMART IDEA – Sharing Best Experiences" training session as a best practice example is based on the following criteria:

Innovative Approach

- The session introduced an innovative format combining practical project development guidance with peer learning and mentorship, promoting collaboration between students, entrepreneurs, and academics.
- Focused on real-world regional challenges, the training encouraged participants to develop sustainable and innovative solutions through the SMART Innovation Challenge.
- Regional Impact
- The event targeted young people in the Shkodra region and the broader Western Balkans, aiming to contribute to regional economic and technological development.
- By guiding participants to address regional needs and opportunities, the training supported the creation of localized, impactful project ideas aligned with regional development priorities.

Capacity Building

- Students and young entrepreneurs were provided with practical skills, knowledge, and tools necessary to engage in innovative project development.
- The training fostered connections with experienced mentors, enabling continuous support and knowledge transfer beyond the event itself.

Increased Awareness of Smart Specialisation Initiatives

- Through its focus on the SMART Innovation Challenge, the training raised awareness about the importance of sustainable innovation and entrepreneurial thinking in the context of smart specialisation strategies.
- Participants gained insights into how their project ideas could contribute to regional innovation ecosystems, addressing real societal and economic challenges.

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

Project Objectives

- Empower students and young entrepreneurs to think innovatively and develop sustainable solutions to real regional challenges.
- Introduce participants to the SMART Innovation Challenge, offering guidance on the application process and project development.
- Raise awareness about the benefits of participating in entrepreneurship and innovation initiatives aligned with smart specialisation strategies.
- Create a collaborative environment where participants could exchange ideas, receive mentorship, and build innovation capacity.

Project Activities

- Planning and coordination by the SMART project team in partnership with the Department of Business Administration and SMART Business Hub.
- Selection of expert trainers and mentors: Mirza Berdica, Besar Berdica (MSc), and Elton Shpuza.
- Development of the training agenda, balancing theoretical insights with interactive, hands-on guidance.
- Training session delivery, including:
- Introduction to the SMART Innovation Challenge.
- Step-by-step guidance on project development and pitching.
- Peer learning and mentoring sessions.
- Group discussions fostering collaboration and knowledge exchange.
- Promotion of the event through university channels and institutional networks.
- Documentation and dissemination: Photos, attendance lists, and event reports shared through public communication channels.

Results

- Increased knowledge among participants regarding innovative project development and application procedures for entrepreneurship competitions.
- Establishment of mentorship connections between students and experienced professionals.
- Motivated young innovators equipped with practical skills and inspiration to participate in startup initiatives.
- Increased participation in the SMART Innovation Challenge and similar activities.
- Strengthened the entrepreneurial ecosystem at UNISHK and within the wider regional network.

Regional Impact

- Enhanced regional innovation capacity by encouraging young talents to address local socio-economic challenges through innovation.
- Contributed to smart specialisation awareness, linking individual entrepreneurial initiatives to broader regional development strategies.
- Fostered cross-sector collaboration between academia, business professionals, and students.
- Supported the creation of a sustainable, supportive environment for startups and innovation-driven projects in the Shkodra region and Western Balkans.

Recommendations for Regional Development

Based on the analysis, the following strategic recommendations are proposed:
- Strengthen inter-sectoral cooperation through innovation clusters and public-private partnerships.
- Increase investment in research and innovation infrastructure, particularly in non-capital regions.
- Promote entrepreneurial education with practical learning and mentorship.
- Foster cross-border cooperation and regional innovation platforms.
- Align innovation policies with EU smart specialisation strategies for deeper integration.

"Xhiro n'Shkodër" Training Session

Date: April 15, 2025
Location: SMART Business Hub, University of Shkodra "Luigj Gurakuqi" (UNISHK)

The "Xhiro n'Shkodër" initiative was selected as best practice due to its strong alignment with the objectives of the SMART project and its demonstrated impact on regional development. It embodies an innovative and inclusive approach to tourism by combining digital tools, sustainability, and youth engagement in a way that reflects the priorities of smart specialization. The initiative stands out for its capacity-building dimension, offering students hands-on experience in designing, implementing, and promoting tourism solutions. It also involved a broad coalition of local stakeholders—including the Municipality of Shkodra, tourism businesses, cultural actors, civil society, and media—ensuring both institutional support and community ownership. Through interactive tools such as AI chatbots, digital storytelling, and guided tours, the initiative contributed to enhancing visibility for underrepresented cultural sites while promoting responsible, year-round tourism. Its integrated approach and tangible regional impact make "Xhiro n'Shkodër" a model of best practice for other regions aiming to link innovation, local identity, and sustainable development.

Criteria for Selection of the Best Practice
 The selection of "Xhiro n'Shkodër" as a best practice is based on several key criteria that reflect its innovative character, regional relevance, and contribution to the objectives of the SMART project. The initiative stands out for its creative and inclusive approach to promoting sustainable, year-round tourism in Shkodra, driven by youth engagement and digital innovation. It successfully integrated the use of smart technologies, such as AI chatbots and audio guides, to enhance the tourist experience, while also empowering students to take a leading role in developing and presenting tourism solutions.

Project Objectives

- The "Xhiro n'Shkodër" initiative, developed in partnership with the SMART project, aimed to:
- **Promote sustainable, year-round tourism** in Shkodra by leveraging digital tools and community-based strategies.
- **Empower students** as co-creators and facilitators of innovative tourism services.
- **Strengthen collaboration among key stakeholders**—including academia, local government, tourism businesses, civil society, and media—in shaping the city's tourism future.
- **Raise awareness** of Shkodra's lesser-known cultural and natural heritage through storytelling, digital innovation, and public engagement.
- **Encourage entrepreneurship and innovation**, particularly among youth, in developing tourism-related solutions aligned with smart specialisation strategies.

Key Activities

1. Planning and Preparation

- Collaborative planning between the student club *"Xhiro n'Shkodër"*, SMART project representatives, and faculty.
- Engagement of key stakeholders including:
    - Local government representatives (Municipality of Shkodra)
    - Tourism actors (hotel and restaurant associations, independent guides)
    - Touristic agencies and entrepreneurs working in hospitality and cultural promotion
    - Civil society organizations and cultural heritage NGOs
    - Local and regional media to ensure broader dissemination
- The agenda was co-designed to ensure inclusiveness, focusing on sustainability, digital transformation, and community involvement.

2. Delivery of Counselling and Training Services

- On April 15, 2025, the SMART Business Hub hosted an interactive session open to students, professors, entrepreneurs, public officials, and tourism professionals.
- Core components of the event included:

  o Presentation of initiatives such as free guided tours with digital audio guides, blog articles about hidden treasures, and an AI-powered chatbot to assist visitors.

  o Demonstration of a digital platform designed to support youth-led startup ideas in tourism and creative industries.

  o Facilitated discussions allowing all participants—including tour operators, local NGOs, and business owners—to share feedback, suggest improvements, and co-develop ideas.

  o Media coverage and interviews were arranged to increase visibility and public engagement.

Key Results

- **Student-led Innovation**: Students played a central role in developing tourism content and digital tools, gaining hands-on experience in entrepreneurship and smart tourism planning.
- **Multi-Stakeholder Engagement**: The event fostered strong cooperation between academia, government, private sector, and civil society—building a shared vision for the future of tourism in Shkodra.
- **Digital Transformation in Tourism**: Tools such as the AI chatbot and storytelling blog were well received and seen as scalable ideas for enhancing visitor experiences.
- **Entrepreneurial Stimulation**: Young participants and local startups expressed interest in further developing services linked to cultural tourism, digital platforms, and sustainable mobility.
- **Awareness Raising**: The initiative raised awareness about the economic and social potential of smart, inclusive tourism development among citizens and decision-makers alike.

Regional impact

The regional impact of the "Xhiro n'Shkodër" initiative has been significant across multiple dimensions. By promoting tourism throughout the year and encouraging residents and visitors to explore lesser-known areas, the event helped address the challenges of seasonality and reduced pressure on the environment. The initiative directly supports the region's smart specialization strategy by integrating tourism development with digital innovation and youth engagement. It also fostered collaborative governance, with active involvement from the Municipality of Shkodra, civil society organizations, and local businesses, strengthening cooperation in strategic planning and policy development. Moreover, the use of storytelling and digital tools played an important role in uncovering and promoting hidden cultural assets, reinforcing a sense of identity and pride within the community. Broad media coverage and inclusive public discussions extended the initiative's reach, encouraging civic engagement and setting the stage for future community-driven development efforts.

Collaboration with Liaison Partner

The successful implementation of the "Xhiro n'Shkodër" initiative reflects **o**ngoing collaboration with the **SMART project liaison partner**, who supported:

- **T**hematic alignment with project objectives related to digitalization and sustainable tourism
- Strategic planning and guidance during the preparatory phase
- Dissemination and regional outreach, ensuring broader visibility and stakeholder involvement

This collaboration was crucial for ensuring that the event contributed meaningfully to SMART's overarching goals and reinforced synergies between higher education institutions, students, and regional tourism stakeholders.

Recommendations for regional development

The "Xhiro n'Shkodër" initiative demonstrates how regional development can be significantly strengthened through inclusive, innovation-driven, and sustainable approaches to tourism. One key recommendation is to institutionalize the active

involvement of students and young people in regional planning processes, particularly through structured partnerships between universities and local authorities. Youth-driven innovation labs and startup incubators focused on tourism and culture can play a pivotal role in generating fresh ideas and fostering entrepreneurial mindsets.

Equally important is the consolidation of multi-stakeholder platforms that bring together representatives from local government, academia, tourism actors, entrepreneurs, civil society, and media. These platforms should be used to co-create strategies, align actions with smart specialization priorities, and ensure that decision-making is participatory and informed by local needs.

The event also highlighted the importance of investing in smart tourism tools and practices. Encouraging the use of digital technologies, interactive guides, and online storytelling platforms can greatly enhance the visitor experience and extend tourism beyond peak seasons. These tools should be accompanied by capacity-building programs for tourism providers to support the digital and green transformation of the sector.

To foster long-term impact, it is crucial to support young entrepreneurs through dedicated funding, mentorship, and visibility. Startups offering innovative tourism services should be integrated into regional innovation ecosystems and promoted as models of sustainable development. At the same time, the region should invest in promoting lesser-known cultural assets through digital storytelling and community-based tourism models that celebrate and preserve local heritage.

All these efforts must be aligned with broader regional and European policy agendas, including Smart Specialisation Strategies, the European Green Deal, and digital transition priorities. The outcomes of initiatives like "Xhiro n'Shkodër" offer valuable insights for evidence-based policymaking. Finally, continuous learning and knowledge exchange across regions should be encouraged to build a more resilient and future-oriented tourism economy that benefits communities and enhances regional competitiveness.

SMART BUSINESS HUB
University of "Luigj Gurakuqi", Shkoder

Mission:
To foster innovation and entrepreneurship, to create a thriving ecosystem that drives and promotes the growth of start-ups, support entrepreneurs, and enable students, and researchers to develop smart solutions that address challenges and contribute to economic, and societal advancement.

Vision:
To be a leading centre of innovation, empowering start-ups, entrepreneurs, and researchers to drive sustainable and transformative solutions through collaboration, creativity, and cutting–edge technology.

Key activities:

Trainings & workshops

Consultancy & mentor and support

Research and development

Network

Promoting

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Figure 8: Contact Information SMART Innovation Center UNISHK

4.2.3 "Fan S. Noli" University – SMART INNOVATION CENTER

Demonstrate the results obtained throughout the SMART project and select the best practice examples

UNIKO is outlining best practice examples from the counselling/training sessions together with the liaison partner to present innovative projects that had an impact on the regional development on various levels such as increase of awareness of smart specialization initiatives. The good practices are forerunners of academic know-how on sustainable smart specializations solutions and the related innovation & entrepreneurship competence development in the Western Balkans through SMART Innovation Centres.

1. First training "Smart Tourism: Smart Tourist Destinations. Case Studies"

Tourism is a vital contributor to regional development, especially in culturally rich areas like Korçë in southeastern Albania. However, while traditional tourism has seen moderate growth, the integration of digital tools and data-driven management—the essence of *SMART TOURISM*—remains limited. ***In response to this gap, the Smart Innovation Centre at the University "Fan S. Noli" in Korçë (UNIKO) initiated a training-based activity designed to equip future professionals with the skills and mindset required to transition towards smart tourist destinations.***

SMART TOURISM (ST) is defined by the use of modern technologies—such as mobile applications, real-time data systems, and augmented reality (AR)—to enhance the visitor experience, improve sustainability, and enable evidence-based policy decisions. It goes beyond simply digitizing services. It is a holistic approach that involves stakeholders at every level, from municipal authorities and tourism agencies to local entrepreneurs and travelers themselves.

This training initiative sought to create a learning-by-doing environment where participants, organized into multidisciplinary groups, explored real-world case studies of successful smart destinations. Their goal was to extract applicable insights and formulate practical, technology-based proposals tailored to the unique tourism challenges and opportunities in Korçë. The emphasis was placed on collaborative research, critical

thinking, and innovation—fostering a new generation of tourism professionals who can serve as catalysts of change in their communities.

ST training was designed as a practical and collaborative learning initiative embedded in the academic context of the University "Fan S. Noli" in Korçë (UNIKO), but structured to simulate real-world professional training environments. The focus was on equipping students with hands-on experience in analyzing and proposing smart solutions for tourism, especially in the context of mid-sized cities like Korçë, where digitalization is still in early stages.

The activity followed a hybrid model based on three pillars:

1. conceptual learning
2. collaborative teamwork
3. solution-focused case study analysis.

The format included one guest speaker, who is an expert in this field, that provided valuable insights into the real-life challenges and opportunities in digital tourism development. Participants were grouped into several teams, with each group assigned a specific case study destination. They worked to analyze smart solutions applied in these cities and adapt them into practical proposals for the Korçë context. The training relied on structured feedback loops between the instructor and the teams.

Each group used a standard analytical framework focusing on:

- *Governance and policy approaches to managing tourism flows*
- *ICT infrastructure and digital services for tourists*
- *Sustainability strategies such as green transport and waste management*
- *Accessibility and visitor experience enhancement*
- *Community engagement through participatory tools and local data use*

This structured approach ensured that even the participants engaged critically with complex, multi-dimensional aspects of smart tourism.

The training produced several best practices that can serve as a model for similar initiatives at regional universities or innovation hubs working on sustainable tourism.

a. Case Study Benchmarking as a pedagogical tool

By examining successful destinations, participants gained exposure to real-world applications of smart tourism. For example, the green mobility strategy and digital planning systems of some destinations inspired the participants to prioritize sustainable transport in their projects. *This comparative method proved highly effective in translating global insights into local innovation*.

b. Local adaptation of Smart Solutions

Several groups translated international ideas into local contexts effectively. For example, walking trails and Wi-Fi-based tourist capacity monitoring used in some other areas can be refined to be used in the region. *This local adaptation process fostered critical thinking about what technologies are truly implementable in the Albanian context.*

c. Competency-based outcomes

The activity was strongly aligned with skill development in digital literacy, research design, teamwork, and communication. These outcomes show *the value of practice-oriented training that builds competencies beyond academic knowledge.*

d. Public presentation and stakeholder dialogue

The event, attended by representatives from local government and tourism businesses, was an important part of the methodology. It created a platform for stakeholder engagement and emphasized the real-world relevance of student proposals. This step also enhanced accountability and visibility, encouraging participants to treat their work as professional deliverables rather than academic exercises.

These best practices show *that effective ST trainings do not necessarily depend on external fieldwork or large-scale funding*. Rather, what matters is *a clear framework, real-world relevance, and the encouragement of innovation through team-based inquiry*. The Smart Innovation Centre (SIC) at UNIKO now has a replicable model that can inform future trainings in tourism, innovation, and sustainable development fields across Albania and beyond.

On the educational front, the topic significantly enhanced participants' understanding of ST frameworks and digital tools. Participants acquired essential soft skills—such as teamwork, public speaking, and project management—while also *gaining exposure to cutting-edge technologies applicable to the tourism industry.*

The program also contributed to regional innovation. *UNIKO SIC solidified its role as a hub for applied research and community engagement.* Local tourism entrepreneurs and policy makers began recognizing the value of co-creating smart solutions with academia.

Several reflections emerged from the training:

- There is strong enthusiasm among the population for practical and tech-driven tourism initiatives.
- Despite growing demand, local stakeholders often face limitations in digital literacy and infrastructure.
- Korçë has significant untapped potential to position itself as a smart destination in the Western Balkans, using its cultural richness as a base and digital innovation as a differentiator.

Looking forward:

- ST training model can be institutionalized into annual curricula, with efforts to scale through Erasmus+ Blended Intensive Programmes (BIP).
- Further workshops involving *city planners* and *tourism boards* are also planned to refine and implement the most promising proposals.

This training experience serves as a replicable model for regions seeking to combine education, innovation, and sustainable development—bringing smart tourism from concept to practice, one destination at a time.

2. **"Innovation: The Engine of New and Sustainable Entrepreneurship"**

Innovation and *Entrepreneurship* are more than slogans—they are interdependent processes that shape the way modern economies evolve.

Innovation refers to the creation or improvement of products, services, processes, or business models, while *Entrepreneurship* is the vehicle through which these innovations are brought to market. When combined, they fuel economic growth, generate employment, solve pressing social problems, and build long-lasting impact.

In the traditional view, entrepreneurship was about starting a business, usually by identifying an existing demand and meeting it with a standard product or service. However, in the digital and globalized economy, this model is no longer sufficient. Today's entrepreneurs must be satisfied with saturated markets, climate change, shifting consumer expectations, and fast-evolving technologies. Innovation provides the critical edge that allows entrepreneurs to not only survive but also to thrive.

For example, think of an entrepreneur starting a café in a competitive urban area. A conventional model might struggle to differentiate. Through innovation, however, such as integrating a local sourcing platform, offering augmented reality storytelling for tourists, or gamifying sustainability through loyalty rewards—the same business can become a hub of attention and value creation. This shows that innovation needs not be disruptive in scale—it can be incremental but powerful in effect.

More importantly, innovation enables value creation that is sustainable, inclusive, and adaptable. This is particularly relevant in emerging markets and regional economies where entrepreneurs face systemic challenges such as limited capital, infrastructure, or access to knowledge. Through innovation, these limitations can be overcome

creatively. Mobile banking in Africa, micro-retail platforms in Southeast Asia, and remote learning solutions in rural Europe are prime examples.

In short, innovation transforms entrepreneurship from a reactive activity into a proactive engine of transformation. It allows entrepreneurs to anticipate trends, shape consumer behavior, and contribute to national development goals. Therefore, any training or support framework for entrepreneurs must prioritize innovation as both a mindset and a methodology.

Launching a new venture is inherently risky—but innovation reduces that risk by creating unique value propositions that resonate with specific market needs. At the startup stage, innovation helps in designing products or services that are not only different but difficult to replicate, providing a competitive advantage. Entrepreneurs must begin by cultivating curiosity and problem-awareness—asking what problems need solving, and for whom.

One of the most effective innovation tools for early-stage entrepreneurs is the *Value Proposition Canvas*, which helps them map customer pains, gains, and jobs-to-be-done. This is often supported by tools like *design thinking*, a user-centered approach that encourages rapid prototyping and iterative feedback. In this process, the entrepreneur builds a minimum viable product (*MVP*), tests it with users, collects feedback, and improves quickly—saving time and capital.

Business model innovation is another powerful driver. Instead of simply selling a product, startups today may build platforms, subscription models, or shared economy services. For instance, meal-sharing platforms that connect tourists with local home cooks, or micro-solar solutions offered through pay-as-you-go systems in rural areas, show how new models reach untapped markets.

Another dimension is *process innovation*—making internal operations leaner, more digital, and more responsive. Entrepreneurs can use cloud-based inventory management, automate their marketing via chatbots, or apply AI to analyze

customer feedback. These small process improvements add up to major gains in efficiency, scalability, and customer satisfaction.

Importantly, *innovation also supports scalability—the ability to grow a business without proportionally increasing costs*. Digital tools, cloud platforms, and social media give entrepreneurs the means to reach thousands of users beyond their local context. Smart entrepreneurs also explore how partnerships and licensing can help scale their idea faster than direct investment. To ensure sustained growth, innovation must become embedded in the culture of the startup—not just a one-time activity. Continuous improvement, curiosity, and learning from failure must be encouraged from day one.

Innovation is not optional for entrepreneurs—it is a requirement. In a world facing climate urgency, social inequality, and digital disruption, only those who innovate will succeed in building businesses that are not only profitable but meaningful. Sustainable, inclusive, and locally rooted entrepreneurship depends on bold ideas, supportive ecosystems, and a willingness to challenge the status quo.

Training the next generation of entrepreneurs must therefore focus on cultivating innovation as a core competency. Whether in tourism, tech, health, or education, innovative thinking will be the foundation for building a better future.

As part of its mission to support innovation-led regional development, the Smart Innovation Centre at the University "Fan S. Noli" in Korçë (UNIKO) has implemented several best practices in the design and delivery of training on innovation and entrepreneurship. These practices can be adapted by other institutions aiming to promote smart, sustainable ventures through higher education and community engagement.

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

1. Challenge-based learning framework

One of the most effective pedagogical strategies used was *the challenge-based learning model*. Rather than passively receiving information, participants were asked to respond to a real regional challenge: *"How can Korçë evolve into a smart tourist destination using innovation?"* This open-ended question anchored all training activities and allowed students to work with purpose and autonomy while applying problem-solving tools.

2. Case-study analysis for local adaptation

This method allowed for benchmarking against successful models while developing locally relevant solutions. For instance, while the green mobility system used by some countries served as inspiration, the participants tailored sustainability proposals for Korçë's scale and infrastructure.

3. Interdisciplinary group collaboration

Each team was composed of individuals from different academic backgrounds—marketing, tourism, finance, and management—which mirrored the diversity required in real entrepreneurial teams. This interdisciplinary approach encouraged participants to think beyond their field and fostered more holistic, user-centered proposals.

4. Resource efficiency and innovation under constraints

Despite limitations, the training emphasized *resourcefulness*. Participants were guided to use open-access research. This approach modeled how entrepreneurs often need to innovate under resource constraints—a key reality in early-stage startups.

5. Integration of sustainability principles

Sustainability was not treated as a secondary theme but embedded across all components of the training. Participants learned to consider energy use, environmental impact, community benefit, and long-term feasibility in every idea proposed. *This alignment with the Sustainable Development Goals (SDGs) enhanced the training's relevance and credibility.*

6. Structured use of innovation tools

Participants were introduced to essential innovation tools such as *Business Model Canvas, Value Proposition Canvas,* and *Sustainable Scorecard*, helping them frame their ideas systematically. These tools are widely used in professional innovation settings, equipping participants with transferable skills for future ventures.

These best practices demonstrate how a regional university can act as a catalyst for innovation—even with modest resources—by designing inclusive, participatory, and impact-driven learning experiences. *The Smart Innovation Centre at UNIKO has laid a foundation that can be scaled, institutionalized, and shared with similar institutions across the Western Balkans and beyond.*

The training initiative organized by the Smart Innovation Centre at UNIKO provided valuable insights into how innovation and entrepreneurship education can be effectively implemented in a regional university setting. One of the most significant *lessons learned* is that *innovation flourishes when it is grounded in the local context. Another key takeaway was the value of interdisciplinary collaboration*. Participants from diverse academic backgrounds worked together, allowing them to approach challenges from multiple perspectives. Importantly, the training demonstrated that innovation does not require extensive resources. Exposure to innovation frameworks and tools—such as the Business Model Canvas and Value Proposition Canvas—gave structure to the students' creative processes and enhanced their ability to articulate and refine their ideas. A crucial lesson was that sustainability should be embedded across all activities, not treated as a separate topic.

SMART

Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans
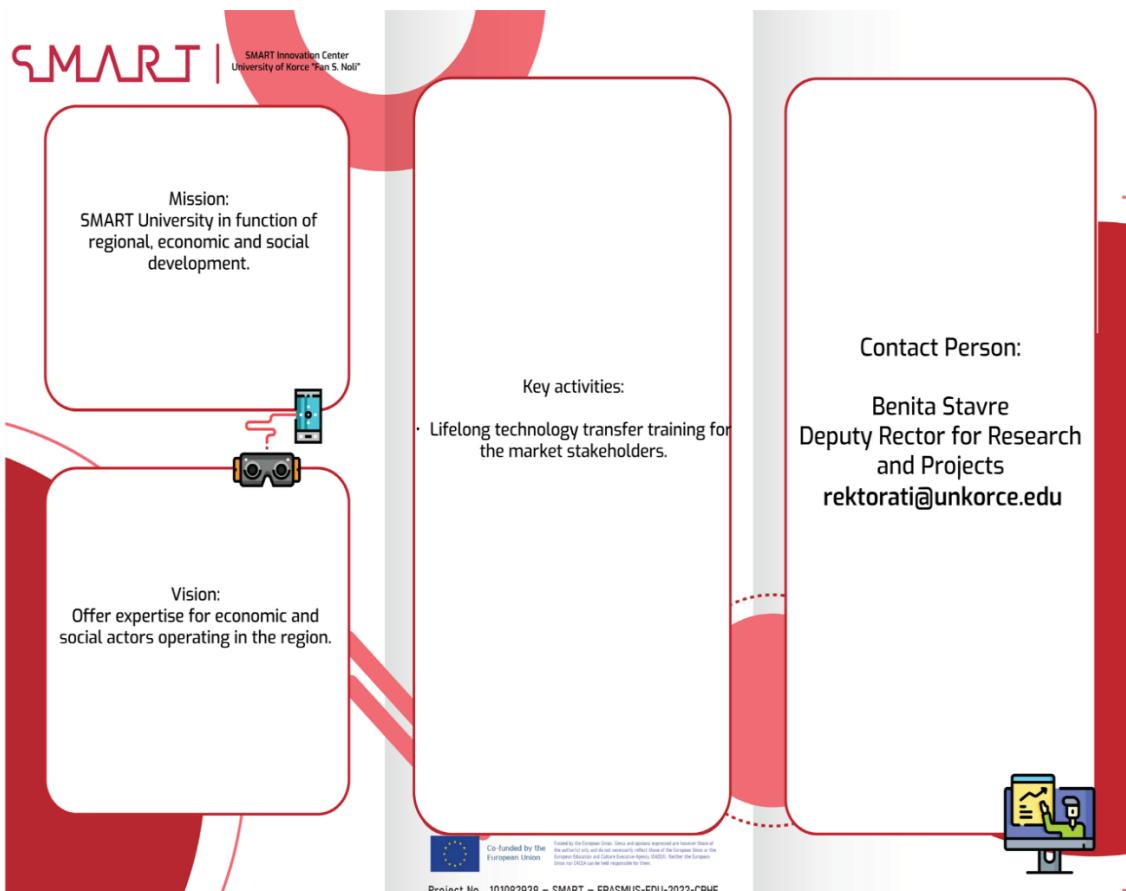
Figure 9: Contact SMART Innovation Center University "Fan S. Noli"

4.3 SMART INNOVATION CENTERS IN MONTENEGRO

The main objective of this phase is to highlight the concrete results achieved through the Hub's ongoing work and to identify best practice examples that demonstrate meaningful impact.

4.3.1 UDG SMART INNOVATION CENTER

UDG SMART Innovation Center support the establishment of an innovative ecosystem that contributes to the development of competencies for innovation and entrepreneurship, promotes smart specialization and thereby contributes to the development of a knowledge based economy. This Center strive to connectthe national innovation ecosystem with industry and business sectors, strengthening digitization and the use of emerging technologies at the national level.

The SMART Innovation Center is dedicated to house and provide access to resources to students, faculty, and innovators in the new entrepreneurship and innovation initiative meeting the needs of development of the S3 areas (IT, agriculture, tourism, energy) at national level in Montenegro and challenges, including economics and entrepreneurship, food production, safety, and security.

Having that the Smart Specialisation actions in Montenegro are related to a flexible model that acts on the time scale of the emergency from knowledge. Therefore, with UDG SMART innovation Center it is proposed a model of co-evolution as a cultural phenomenon of transformation from the dissemination of new creative learning practices to:

- Developing new analytical tools and scientific theoretical knowledge through technology;
- Exploring new fields of knowledge through the new dimensions of applied science;
- Stimulating digital learning for logical action-design awareness.

The particular added-value elements of the proposed action are listed follows:

- Engagement of young researchers and innovators, particularly female scientists.
- Raising awareness about Montenegrin S3 and its importance, promotion of partnership of all relevant stakeholders;
- The use of pilot demonstration as examples of innovation and best practice could serve as a basis for new research, innovation and commercial projects in S3 priority domains.
- Strengthening interdisciplinary research and innovation across priorities of the S3.
- Enabling all of the students and researchers from UDG and S3 community with an opportunity to gain a hands-on experience with the in-house HPC/AI lab.

The above coincide with the priority economic sectors that have been defined and confirmed in all of them key strategic documents of the Government of Montenegro, namely: tourism, energy (energy efficiency), agricultural production, processing industry and the IT sector (innovative activities based on accelerated digitization and growth).

The UDG SMART Innovation Center is expected to have national coverage, which shall be reflected through full openness to all academic institutions in Montenegro and implementation of close cooperation with business sector, public bodies and all relevant stakeholders of the industry 4.0 at national level. The UDG SMART Innovation Center is expected to capitalize available resources and existing experience at least at constituting roots. The UDG SMART Innovation Center is expected to integrate best practices and experiences at EU and global level, mainly throught creation of close cooperation links and collaboration channels.

Innovation centre´s mission statement (Value Proposition)

Our mission is to establish an innovative ecosystem that enhances competencies in innovation and entrepreneurship, promotes smart specialization, and contributes to the growth of a knowledge-based economy. We will strive to connect our center and the national innovation ecosystem with industry and business sectors, strengthening digitization and the use of emerging technologies at the national level. We aim to fully

Innovation Centres for the Development of Innovative and
Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

achieve the goals of the Erasmus+ SMART project and ensure long-term sustainability in achieving these objectives.

Innovation centre´s vision (Key Activities and Key Resources)

Our vision is to strive to foster a culture of creativity and forward-thinking, continuously seeking novel solutions to meet emerging challenges. Additionaly, we are committed to building strong relationships with our stakeholders, including students, faculty, industry partners, and the broader community. We pursue excellence in education, research, and entrepreneurship, ensuring the highest quality in our programs and initiatives. And we believe in the power of collaboration, encouraging partnerships and teamwork across disciplines and sectors.

Our vision is to establish the **SMART Innovation Center as a leading hub for innovation and entrepreneurship on a national level,** driving economic development through the commercialization of research, start-up incubation, and robust industry partnerships. We aim to create a self-sustaining ecosystem that continuously nurtures talent, fosters technological advancement, and promotes a knowledge-based economy.

The targeted organization model of UDG SMART Innovation Center is presented in Figure 10.
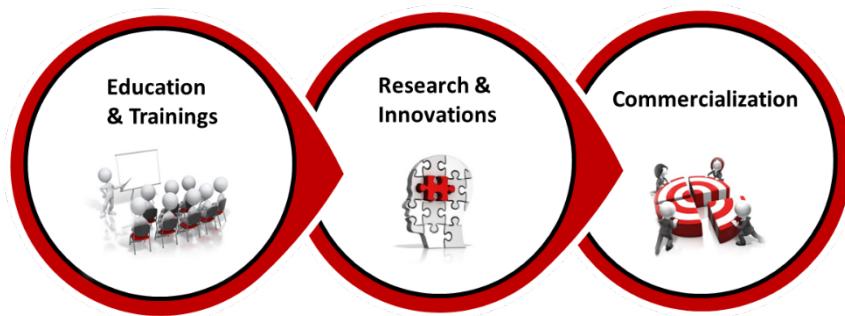
Figure 10: Targeted organisational model UDG SMART Innovation Center

Description of Services and Problem-Solving Approach

In the UDG Innovation Center is focused on **a regional and system impact approach** and offer the following five micro actions:

The **TRAINING ACTIVITIES** focus on training courses, guidance services and networking with companies for students, doctoral students and researchers and the enhancement of skills, also through entrepreneurship and programs reinforcing the figure of the researcher as innovation driver. Modernization in Information System education based on the student-oriented principals, strong university-enterprise cooperation and modern approaches to the education within Bachelor and MSc study. The center provide trainings for beneficiaries within the University, as well as and for external beneficiaries.

Business Support and Mentoring

Description: Student teams can apply for business support or mentoring for a longer period of time. Professional staff from Montenegrin companies and universities report their willingness to provide business support and mentoring to student teams by describing their area of expertise. Student teams submit an online request for mentoring or business support with a description of the project idea and the capacities of their team. After accepting the mentorship, the Mentor follows the activities of the student team and actively participates in planning, organizing and implementing project ideas. Monitors the engagement of each individual in the team. At the end of the project, he writes recommendations for each team member.
Users: all interested MNE students and innovators
Service providers: UDG SMART Innovation Center, in cooperation with external companies

Practical teaching in digital skills for students
Description: It is necessary to ensure online application of students for attending practical classes in certain subjects, monitoring of their activities, examination and evaluation which will be evaluated as part of the examination obligations during regular studies. The software solution should support the following procedures:

Definition of practical teaching units from certain subjects in certain study programs of the faculty; Application of the student to attend certain practical classes; Monitoring student engagement during classes; Examination and Evaluation of the student.
Users: UDG students
Service providers: UDG SMART Innovation Center in cooperation with external companies

Creating awareness about digital technologies

Description: The university will offer the economy a certain number of courses of various purposes with the aim of presenting the importance of digitization of business processes to the relevant economic entities. It is necessary to provide a description of the course, its duration, with the goals and outcomes of the course. Provide online registration of business entities. Provide online access to teaching material and the possibility of students working independently. Provide an adequate way of testing and certification.
Users: MNE companies and other stakeholders in the process of digitization
Service providers: UDG SMART Innovation Center in cooperation with extrenal entities

The **INCUBATION PROGRAMMES** will work in the business idea generation stage, starting from university students, intercepting those ideas through permanent scouting activities in the university departments and research institutes and supporting them with training, consultancy and coaching in order to validate idea feasibility. Matching opportunities with companies and investors will complete the programs. The incubation programmes and services will be offered not only for UDG students but for all students and young people in Montenegro and Region and it will be offered with UDG partners.

Support for establishing a Start-up

Description: Student team can apply for support for the development of a startup company at any stage in the development of a start-up. In his request, he basically describes what kind of support he is requesting. After the interview and the final agreement with the university, cooperation is agreed and appropriate resources and support are allocated. It is necessary to record requests, contractual obligations and monitor the development of start-ups through six-monthly reporting.
Users: all interested MNE students and innovators
Service providers: UDG SMART Innovation Center in cooperation with external companies

Connecting with potential investors

Description: It is necessary to enable the application of student teams for potential sources of funding for their project ideas. After the request is approved, various events are organized: Presentation of potential grants, connection with potential investors, Exchange of entrepreneurial ideas, etc. Connection with Technopolis, Technology Park, MTel digital factory, Digital Den Hub etc.

Users: all interested MNE students and innovators

Service providers: UDG SMART Innovation Center in cooperation with extrenal companies and relevant bodies at national/international level

Success stories and Lesson Learned

Organisation of student competition IDEALAND – Exchange of Business IDEAS and SMART Student Contest

The SMART Innovation Center at the University of Donja Gorica (UDG) provided crucial support to students during the entrepreneurial ideas competition at the IDEALAND – Exchange of Business IDEAS and the SMART Competition. As one of the first student entrepreneurship supporters in Montenegro, UDG has long been committed to fostering entrepreneurial spirit among students, guided by the innovative equation of Professor's, which states that a student's ability equals the knowledge gained multiplied by the intensity of living squared ($S = z * i^2$). Through this support, students received not only financial backing for their business ideas from a network of around 30 companies but also mentorship and encouragement to develop their innovative concepts. The participation in these competitions offered students a unique platform to showcase their creativity and courage, with the opportunity to present their ideas to potential investors and partners. The best ideas, especially those focusing on innovation, gained recognition and could be considered for negotiation with interested companies. This initiative, part of the longstanding "International Exchange of Entrepreneurial Ideas – IDEALAND" project, exemplifies UDG's dedication to nurturing the entrepreneurial ecosystem and advancing student-led innovations.

The **ACCELERATION PROGRAMMES** will support business set up for knowledge-based spinoffs and startups based in the Region through a network of actors and initiatives, offering consultancies, mentorship, training and internationalization services. Matching opportunities with companies and investors will complete the programs. First SMART Comptetition was held from February to April 2025 in Montenegro. During the process of the Startup Acceleration phase UDG SMART Innovation Center provided targeted support and mentorship to participating teams, helping them refine their presentations and transform them into concrete, detailed plans. This phase involved workshops, expert consultations, and mentorship sessions in SMART Innovation Centers. The aim was to guide students through the entire process of developing their business concept, from the initial idea to a well-structured and feasible proposal, equipping them with the knowledge and skills necessary to advance their ventures.

TECHNOLOGY TRANSFER actions will foster science-industry relations between regional businesses and universities, increasing awareness on the key strength points of the ecosystem, working with research organizations to respond to businesses' technological needs. Additionally expertise of the SMART Innovation center will provide to business sector and all relevant institution with offered service regarding implementation of Transfer Technology Guide in different areas, especially focusing on activities for patenting policy in Montenegro. Example already created Technology Transfer Guide in agriculture: <u>Technology Transfer Guide - FoodHub (udg.edu.me)</u>

Patent activity in the areas of the Western Balkans (WB) is of very low intensity - the annual number of patent applications is very modest, so one can speak of a lack of patent culture. It is necessary to add to this finding that the main motivating factor in career development for researchers in WB is practically exclusively the publication of papers in scientific journals that are refereed in the WoS. That is why the appearance of this Guide is one of the pioneering steps in the promotion of inventiveness and, possibly, innovation that would be made by the commercialization of inventions that are the result of scientific work at Universities and Institutes, and which are protected by some form of intellectual property. The author of this document, when writing the Guide, constantly had in mind the need to translate **the intellectual capital of the science sector into a knowledge-based economy.**

Commercialization of services provided by UDG SMART Innovation center, implemented within:

- Potential start-up and spin-off development – support to potential start-ups was prepared with a team proposal and ideas from different fields such as creative industries, IT, agriculture etc.
- Film and media studio – support start-ups and creation of video animations, promotional videos and multimedia.
- Close cooperation with National Competence Center in Montenegro for High Performing Computing focusing of application of modern technology in business and promotion of success stories.
- Collaborative research: UDG can announce its interest in collaborating with companies in specific research. Notifications about the invitation are sent to all interested companies; Also, the request for cooperation can be sent by the company, then the request is submitted through a special form. When cooperation is signed/a project is handed over/something is organized; information for promotion is generated. Users: MNE companies and other stakeholders in the process of digitization Service providers: UDG in cooperation with extrenal entities

Key Results

- **Student-led Innovation**: Students played a central role in developing tourism content and digital tools, gaining hands-on experience in entrepreneurship and smart tourism planning.
- **Multi-Stakeholder Engagement**: The event fostered strong cooperation between academia, government, private sector, and civil society—building a shared vision for the future of entrepreneurship in Montenegro
- **Digital Transformation in Tourism and Food Technology**: Tools such as the AI chatbot and other application that are developing within students were well received and seen as scalable ideas for enhancing visitor experiences.
- **Awareness Raising**: The initiative raised awareness about the economic and social potential of smart, inclusive tourism development among citizens and decision-makers alike.

Regional impact

The UDG Smart Innovation Center directly supports the region's smart specialization strategy by integrating entrepreneurship, innovation and tourism development with digital innovation and youth engagement.

Collaboration with Liaison Partner

The collaboration with Liason Partners within SMART Innovation Center collaboration was crucial for ensuring that the event contributed meaningfully to SMART's overarching goals and reinforced synergies between higher education institutions, students, and regional tourism stakeholders.
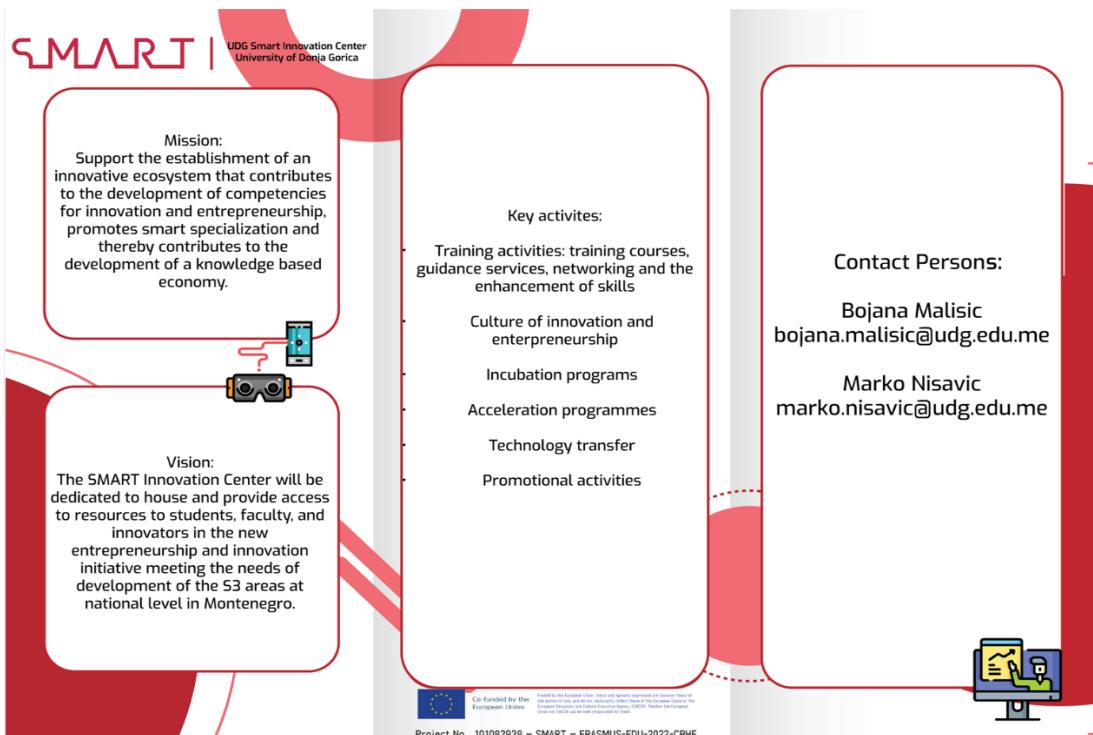
Figure 11: Contact Information UDG SMART Innovation center

4.3.2 SMART Innovation Center for 3D Printing, University of Montenegro

The SMART project tackles the issue of limited innovation capacity in the field of smart specialization across the Western Balkans, focusing on Albania, Bosnia and Herzegovina, and Montenegro. It aims to help partner universities move beyond their traditional role as knowledge providers and become key contributors to the regional innovation ecosystem. The SMART Innovation Center for 3D printing objectives were designed to equip participants with practical skills while also introducing them to potential career and entrepreneurial opportunities in this emerging field.

Success story and Lesson Learned

Trainings for stakeholders

Since through this project University of Montenegro have purchased the first 3D Food Printer in Montenegro for the SMART Innovation Center for 3D Printing and the second existing 3D Food printer in Montenegro is at University Adriatic, Faculty of Management in Herceg Novi - we have trained their staff and their students to use it, because of great potential it has. Other target participants were identified as researchers from Serbia and Albania that had visiting research periods in Montenegro and could use this laboratory equipment for their scientific expertise, so this opportunity gave us the possibility to make these training broader than just in Montenegro. And our focus was also on the staff from the only company dealing with 3D modelling and 3D printing in Montenegro, but did not have the chance to explore 3D Food printing. The training was designed to accommodate both beginners and participants with prior experience, promoting inclusivity and active engagement for everyone involved.

The scheduling of the training was thoughtfully organized to enhance learning outcomes and fit the availability of participants. Over four days, the sessions were focused on introducing and deepening knowledge in 3D food modeling and printing—starting from basic design principles and software tools, progressing to hands-on applications and practical demonstrations of the technology.

All necessary equipment, including computers equipped with specialized 3D modeling software such as Blender, Tinkercad, and Fusion 360, was provided to ensure a practical, hands-on learning experience. A 3D food printer was also set up and prepared for demonstrations and participant interaction. Alongside this, relevant supplies and tools were organized, and training materials - along with a detailed presentation on the SMART project - were used to support the learning process.

The first training session was attended by 30 staff and students from the University Adriatic and the Faculty of Management, both of which have the same 3D food printer model as the SMART Innovation Center for 3D Printing. They were eager to explore the potential of this emerging technology, particularly in 3D food modeling and the operational aspects of the 3D food printer. The second and third sessions welcomed two professors - one from Tirana and another from Novi Sad - who were interested in incorporating this technology into their research projects. The fourth training was specifically organized for staff from Montenegro's largest 3D printing company, 3D soba, who until then had not had the opportunity to work with this advanced technology.

Within workshops and trainings participants has explored food printing for research purposes, emphasizing the development of customized, nutritious, and sustainable food products, including special textures designed for dysphagia patients. It also highlighted the potential of 3D food printing in the restaurant industry, particularly for Michelin-starred establishments aiming to create innovative and personalized dishes. Additionally, participants learned how to design interesting logotype 3D models specifically for food printing applications.

Long-Term Effects:

The knowledge and skills gained during the training are expected to positively influence the participants' future academic, research, and entrepreneurial activities. By fostering an understanding of the potential applications of 3D food printing, especially within local

SMART

Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans

innovation ecosystems, the training supports the broader SMART project objectives of capacity building and sustainable development in the Western Balkans.

All these efforts must be aligned with broader regional and European policy agendas, including Smart Specialisation Strategies, the European Green Deal, and digital transition priorities. The outcomes of initiatives of SMART Innovation center for 3D printing offer valuable insights for evidence-based policymaking. Finally, continuous learning and knowledge exchange across regions should be encouraged to build a more resilient and future-oriented Digital montenegro that benefits communities and enhances regional competitiveness.

SMART | Innovation Center for 3D printing University of Montenegro

Mission:
To foster an innovation ecosystem focused on smart specialization and entrepreneurial competencies, promoting the use of sustainable materials in 3D modeling and printing.

Vision:
To transform the Faculty of Electrical Engineering into a hub for sustainable innovation that educates and empowers, driving regional development through strong academic-business partnerships, and emphasizing the protection of natural resources and environmental sustainability.

Key activities:

Training and Education : Online and onsite courses and training for 3D modeling and printing.

Incubation and Acceleration : Support for the establishment of knowledge-based companies, spin-off companies, and startups that are based on 3D modeling and printing.

Technology Transfer : Strengthening the relationship between science and industry and supporting the technological needs of companies.

Public Education : Increasing public awareness of the circular economy and the use of recyclable and biodegradable materials.

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Project No. 101082938 – SMART – ERASMUS-EDU-2022-CBHE

Figure 12: Contact Information Innovation center for 3D Printing

CHAPTER 4

SMART NETWORKING AND COLLABORATION

Strengthening the Regional Innovation Ecosystem

"The SMART Knowledge Exchange Network –
a platform to foster ongoing collaboration,
open innovation, and effective implementation
of S3 strategies in the region."

5. SMART NETWORKING AND COLLABORATION - Strengthening the Regional Innovation Ecosystem

Background and introduction

In an increasingly complex and fast-evolving world, Smart Specialisation Strategies (S3) have emerged as essential policy frameworks for driving place-based innovation, sustainable economic transformation, and social resilience. By identifying regional strengths and fostering cross-sectoral and multi-level collaboration, S3 strategies aim to bridge research, policy, and practice – delivering meaningful, lasting impact for local communities and society at large. Yet, their successful implementation demands multi-level coordination, sustained stakeholder engagement, and continuous knowledge exchange among academia, industry, civil society, and public institutions.

To address these challenges, the SMART project was designed to enhance the capacity of Higher Education Institutions (HEIs) in the Western Balkans and promote their collaboration with businesses, public bodies, and civil society – both within the region and across the European Union. Within this framework, Work Package 6 (WP6), led by Fondazione Politecnico di Milano, established the SMART Knowledge Exchange Network – a platform to foster ongoing collaboration, open innovation, and effective implementation of S3 strategies in the region.

WP6 was structured around three core activities:

- Defining the Network's conceptual and organisational framework;
- Developing its visual identity and digital platform;
- Delivering training sessions for external stakeholders.

Network Design: A Multi-Level Approach

The SMART Knowledge Exchange Network was developed through a participatory process, involving collective discussions and decision-making to define a shared purpose and operational framework. This inclusive approach ensured all members felt represented, resulting in a cohesive, multi-layered structure.

Conceived as a "network of networks", it connects local and national innovation ecosystems within a broader transnational framework. At its core are the SMART Innovation Centres (SICs), established under WP5 in partner HEIs across Albania, Bosnia and Herzegovina, and Montenegro. These centres serve as local anchors, grounding the Network in diverse regional contexts while progressively linking them to wider collaborations at national, regional, and European levels.
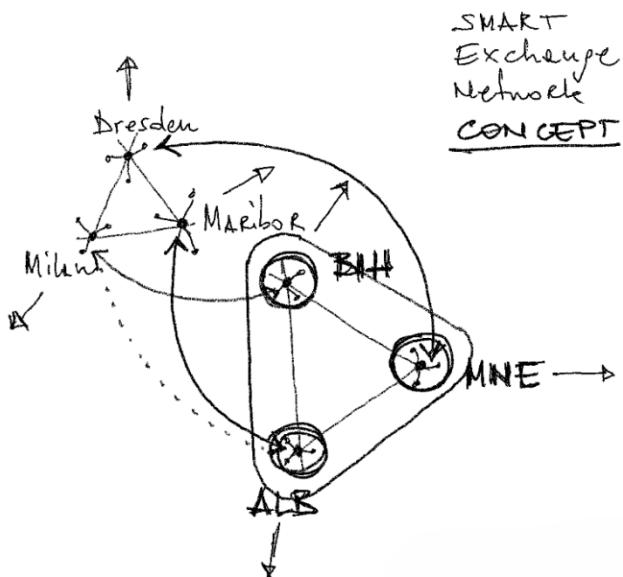
Figure 13. Early sketch for the conceptualisation of the SMART Knowledge Exchange Network

This multi-level model aligns with the Quintuple Helix Innovation Model, emphasising place-based collaboration among academia, industry, public bodies, and civil society across nested scales. By providing a shared space for stakeholders, the Network facilitates knowledge exchange, joint problem-solving, and collaborative initiatives – addressing challenges in research, innovation, entrepreneurship, and sustainable regional development. Through these connections, members gain complementary competencies to implement S3 strategies more effectively.

Vision and Objectives

The SMART Network envisions a knowledge-driven region where diverse stakeholders cooperate to advance innovation, sustainable growth, and regional integration. Acting as a bridge between the EU and the Western Balkans, it supports S3 implementation by leveraging local strengths and addressing context-specific challenges. Its goal is to create synergies among academic institutions, businesses, and public bodies – harnessing their combined expertise to build a dynamic regional ecosystem where open innovation and entrepreneurship drive lasting development.

To achieve this, the Network:

- Connects universities, businesses, and institutions across the Western Balkans, enabling knowledge exchange, capacity building, and collaborative projects in Smart Specialisation;
- Delivers targeted training on S3, open innovation, and entrepreneurship;
- Supports startups and entrepreneurs through mentoring and innovation centres;
- Launches joint research and innovation initiatives to tackle regional challenges;
- Raises awareness of S3 through regional and international dissemination.

Governance: A Structured, Inclusive Model

To ensure long-term sustainability and effectiveness, the Network adopted a three-tiered governance structure designed to balance strategic oversight, collective representation, and operational coordination.

At the strategic level, the Managing Board, which comprise representatives from SMART project partners and National Board coordinators, serves as the Network's decision-making body. It provides overall direction, approves key initiatives, and ensures alignment with the Network's long-term vision. The Board also manages external partnerships and guides the Network's evolution, ensuring its growth remains consistent with its core mission.

The representative level is embodied by the General Assembly, which brings together delegates from all member organisations. Acting as the Network's primary forum for collective input, the Assembly ensures that activities reflect shared priorities, validates

operational plans, and maintains alignment with the strategic guidance provided by the Managing Board. This inclusive approach guarantees that the Network's actions are both relevant and responsive to the needs of its diverse membership.

At the operational level, National Boards function as local coordination hubs in Western Balkan countries. These boards facilitate communication, collaboration, and the identification of regional priorities, ensuring that local perspectives are effectively integrated into the Network's broader transnational strategies. By bridging local and regional needs, they help maintain the Network's responsiveness and adaptability.

Together, this governance model ensures the Network remains functional, inclusive, and scalable, fostering sustained cooperation, encouraging new memberships, and strengthening partnerships across the Western Balkans and the wider European innovation ecosystem.

Visual Identity and Digital Platform

The Network's visual identity began with the design of its logo, created in collaboration with all partners to reflect its connection to the broader SMART project. The final design features two overlapping networks – one red as the main project colour (representing the Western Balkans) and one blue (the EU) – symbolising interconnection and mutual support.

Figure 14: The SMART Network logo

This identity extends to the digital platform, integrated into the project website. The platform serves as a key tool for members to share Knowledge Exchange Opportunities, accessible to all target groups: researchers, students, businesses, SMEs, startups, policymakers, and other stakeholders. To date, around 30 opportunities have been published, covering areas such as entrepreneurship education, digital innovation, and multi-stakeholder collaboration. These contributions, from both Western Balkan and EU partners, demonstrate the platform's potential as an active hub for cooperation and mutual learning.
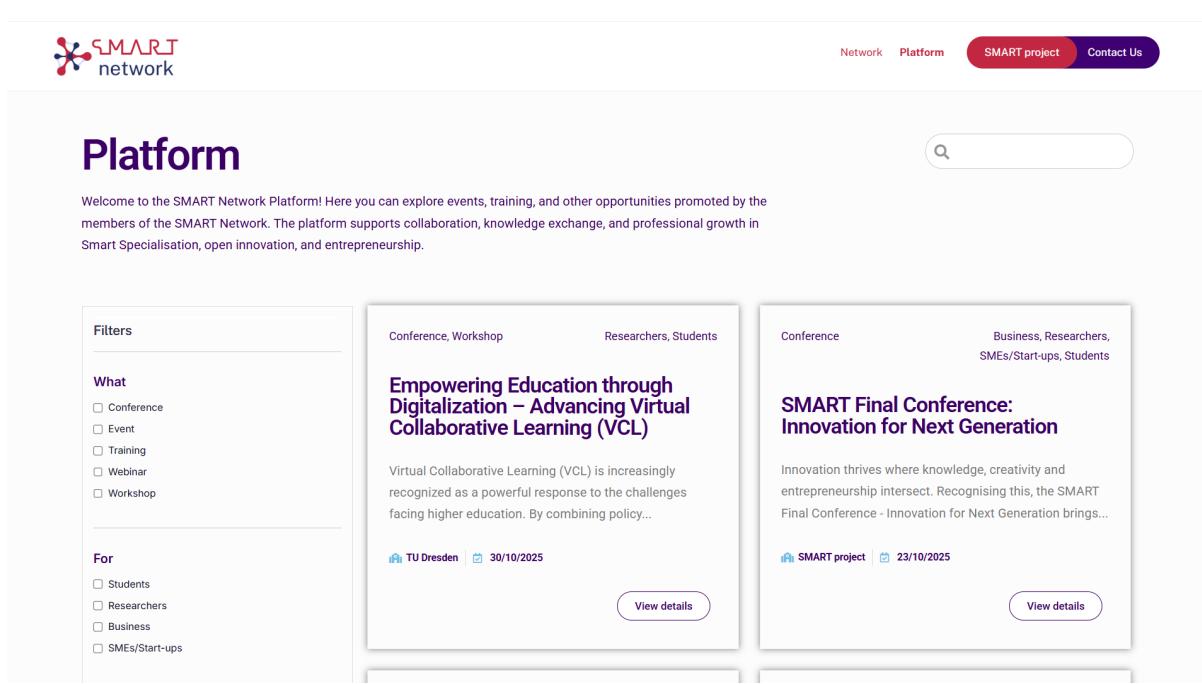
Figure 15: Screenshot of the SMART Network platform

Training Sessions and External Engagement

The third WP6 activity focused on training sessions for non-partner universities and stakeholders, extending the Network's reach. Between February and June 2025, Western Balkan HEI partners organised 10 sessions through their SICs, engaging 216 participants. These sessions addressed key topics such as Smart Specialisation, university-business cooperation, and sustainable development, raising awareness of S3 and introducing SICs as local innovation hubs.

Each event was tailored to its context, blending academic input with practical discussion. The participation of students, lecturers, business representatives, and policymakers fostered meaningful exchanges, strengthening local and regional connections.

The sessions also helped engage external stakeholders-organisations interested in joining the Network and professionals added to the experts' database. This database, continuously updated, enhances transparency and accessibility, promoting cross-sectoral collaboration among members and external actors.

Beyond these sessions, the Network actively pursued synergies with other European initiatives to expand its reach and impact, such as the signature of a Memorandum of Understanding with the EIT HEI Initiative's HEI4Future project – enabling mutual access to training opportunities – or the partnership with the COWEB project – resulting in joint dissemination events and conference sessions. These synergies further consolidated the cooperation of the Network among innovation ecosystems across Europe.

Reflections and Future Outlook

The development of the SMART Knowledge Exchange Network demonstrates how a shared, collaborative framework can translate an ambitious vision into a tangible mechanism for cooperation. The process required balancing ambition and feasibility, navigating diverse institutional and regional contexts. Through a gradual, participatory approach, partners aligned expectations, shaped the Network's identity, and built a sense of collective ownership.

This experience highlighted the value of diversity and inclusivity: by bringing together institutions of varying scales and backgrounds, the Network created a rich learning environment, strengthening mutual understanding and capacity. Today, it stands as a living platform for collaboration and knowledge exchange, enabling members to leverage their complementary strengths for shared innovation and progress.

Looking ahead, three factors will be critical for long-term sustainability:

- Active member engagement, to keep the Network dynamic and evolving;
- Strategic resource mobilisation, including securing new funding and launching joint initiatives;
- Openness to evolution, through periodic reviews and the integration of new partners, to remain responsive to emerging priorities.

In the long run, the Network's legacy may lie in the institutional culture it has fostered – one that values cooperation, openness, and cross-border growth. Beyond creating new collaboration mechanisms, it has also formalised, enhanced visibility, and integrated previously dispersed good practices into a broader, transnational framework. In doing so, it has not only contributed to strengthen the innovation ecosystem in the region but also deepen its connection to the wider European landscape.

Ultimately, the SMART Network has laid the groundwork for a more interconnected and resilient innovation ecosystem in the Western Balkans, where regional cohesion becomes a driver for sustainable development and deeper European integration.

CONCLUSION

"The lessons leraned confirm that innovation ecosystems grow strongest when knowledge is co-created, ownership is shared, and progress is measured not only by outputs but by evolving relationships and capacities."

SMART

Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans

CONCLUSION

The SMART Project (SMART Innovation Centres for the Development of Innovative and Entrepreneurial Thinking to Facilitate the Development of Sustainable Smart Solutions in the Western Balkans) has shown that strategic investment in higher education can catalyse systemic transformation across regions, sectors, and generations.

Implemented under the Erasmus+ CBHE programme (2022–2025), the project united 14 partners from six countries to build a collaborative framework that integrates innovation, entrepreneurship, and smart specialisation into the academic, economic, and social fabric of the Western Balkans.

From its outset, the SMART project aimed to strengthen universities' capacity to act as drivers of regional innovation ecosystems. Through a coherent set of interventions, i.e. capacity building, establishment of seven SMART Innovation Centres, and creation of the SMART Knowledge Exchange Network, the project has supported HEIs to advance from teaching hubs to proactive agents of socio-economic development.

The results are both structural and cultural: hundreds of staff and students trained, new opportunities created, long-term cooperation forged between academia, business, and government, and an emerging culture of innovation taking root across partner countries.

6.1 Lessons Learned

The SMART experience offers valuable lessons for similar initiatives in higher education and regional development:

- Interdisciplinary and cross-border collaboration multiplies impact. Bringing together faculties from different disciplines and partners from various countries led to richer, more creative, and more sustainable solutions.
- Centres thrive with structured programmes. Competitions, incubation schemes, and recurring training cycles proved essential to maintaining engagement and giving the Centres continuity.
- Active student involvement drives relevance: Through competitions, exchanges, and case studies, students engaged directly with industry and communities,

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Entrepreneurial Thinking to Facilitate the Development of
Sustainable Smart Solutions in the Western Balkans

gaining hands-on experience in interdisciplinary teams supported by peer learning and mentorship.

- Infrastructure and equipment matter.
  The Centres' modern facilities and creative spaces became focal points of identity and belonging. Students now see them as their innovation homes.
- Networks outlast projects. Partnerships built during SMART have laid the groundwork for regional cooperation and increased visibility of Western Balkan HEIs at both national and European levels.
- Entrepreneurial culture is emerging but needs nurturing. While progress is visible, continuous awareness-raising and structured programmes are required to sustain momentum.
- Local context determines success. Solutions rooted in local realities, such as agri-food, fisheries, or tourism, proved the most relevant and scalable.
- Sustainability must be mainstreamed. It should be embedded across all activities, not treated as a separate or final stage of project implementation.

These lessons confirm that innovation ecosystems grow strongest when knowledge is co-created, ownership is shared, and progress is measured not only by outputs but by evolving relationships and capacities.

6.2 Looking Ahead

The SMART consortium has built a foundation that will continue beyond the project's lifetime. The coming years will focus on consolidating achievements and expanding cooperation through several strategic directions:

- Increase visibility of the SMART Innovation Centres. Local outreach events, mini-placements, conferences, and open days, have proven effective in raising awareness and stakeholder engagement.
- Establish a permanent SMART Innovation Network. By connecting all Centres into a single regional platform, the network will ensure knowledge exchange, mobility, and collective advocacy.
- Deepen collaboration between academia and business. Building on existing partnerships, the Centres will serve as key nodes linking education, research, and industry.

- Launch joint research clusters. Priority areas include ICT, tourism, agri-food, and renewable energy, leveraging shared laboratories and infrastructure.
- Co-organise regional innovation competitions and accelerators. These initiatives will enhance cross-border student mobility and support start-ups emerging from university environments.
- Advocate for regional innovation policy harmonisation. Through collective engagement, the Centres and Network will contribute to aligning national S3 with EU innovation agendas.
- Position Centres as sustainability anchors. Each SMART Centre will evolve into a long-term institutional unit capable of attracting EU, donor, and private-sector investment beyond project funding.

6.3 A Sustainable Legacy

The SMART project has shown that smart specialisation is more than a policy framework, it is a learning process grounded in collaboration, experimentation, and shared vision. By integrating innovation structures within HEIs, establishing cross-sectoral networks, and promoting hands-on learning, SMART has planted the seeds of a sustainable innovation culture across the Western Balkans.

The journey from fragmented awareness to structured collaboration has been transformative. Universities have gained confidence as regional actors, students have become agents of change, and policymakers have recognised higher education as a driver of sustainable competitiveness.

As the Western Balkans continue their path toward European integration, the achievements of the SMART project stand as evidence that regional progress is built not only on investment but on shared vision, partnership, and trust. The seven SMART Innovation Centres and the Knowledge Exchange Network now carry forward this vision, embodying a commitment to learning, innovation, and collaboration that will continue to shape the region's smart and sustainable future.

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