



# Interreg



## Danube Transnational Programme

### DanuBioValNet

# Roadmap Report

## HEMP Value Chain

**WP3 Value Chain Mapping**

**Activity 3.4 Roadmapping**

**D 3.4.1 Roadmap reports for all three VC**

***Cross-clustering partnership for boosting eco-innovation  
by developing a joint bio-based value-added network for the Danube Region***

**Zuzana Polova, Pavla Bruskova**

[interreg-danube.eu/danubiovalnet](http://interreg-danube.eu/danubiovalnet)  
[twitter.com/danu\\_bioval](https://twitter.com/danu_bioval)



This report was produced within the frame of the DanuBioValNet project (Deliverable 3.4.1 - Roadmap reports for all three VC), co-funded by European Union funds (ERDF, IPA) through the INTERREG Danube Transnational Programme. It was prepared by Zuzana Polova and Pavla Bruskova (National Cluster Association, Czech Republic).

The authors would especially like to thank main contributor Daniel Acs (PROUNION, Slovakia) for his participation and inputs in the workshop.

## Disclaimer

The information and perspectives set out in the “Roadmap Report Hemp Value Chain” are those of the authors and do not necessarily reflect the official opinion of the European Commission or the project partners’ regions. Neither the European Commission institutions and bodies nor any person acting on their behalf may be held responsible for the use that may be made of the information contained therein. Reproduction is authorized, provided the source is acknowledged unless otherwise stated. For use/reproduction of third party material specified as such, permission must be obtained from the copyright.

For further information about the DanuBioValNet project, you will find a short description in the document. To learn more and to download additional resources please refer to the project website <http://www.interreg-danube.eu/approved-projects/danubiovalnet>.

The information is provided without assuming any legal responsibility for correctness or completeness. The data presented in the report are based on the information given by the project partners.

© DanuBioValNet, June 2018

## TABLE OF CONTENTS

Introduction of the DanuBioValNet Project .....	4
List of Abbreviations.....	4
Glossary.....	5
<b>I. Background and Relevance .....</b>	<b>6</b>
Importance of the HEMP Industry and associated Support.....	6
Overview of the HEMP Industry .....	6
<b>II. Workshop Results.....</b>	<b>7</b>
Objectives of Roadmapping Workshop.....	7
Approach and Methodology.....	7
The Participants of the Workshop.....	7
Workshop Results.....	8
<b>III. Recommendations and Inputs for WP4, WP5 and WP6 .....</b>	<b>11</b>
WP4 Joint Bio-Based Industry Cluster Policy Strategy .....	11
WP5 Open Space Innovation Arenas and New Cluster Management Services .....	12
WP6 Pilot Actions .....	12

## INTRODUCTION OF THE DanuBioValNet PROJECT

The DanuBioValNet project is a cross-clustering partnership for boosting eco-innovation by developing a joint bio-based value-added network for the Danube Region. DanuBioValNet stands for development of a joint bio-based industry cluster policy strategy, clusters connecting enterprises transnationally, new bio-based value chains in the Danube Region and eco-innovations for supporting regional development.

The DanuBioValNet project, launched in 2017 through a cross-regional partnership involving 17 partners from 10 Danube regions, will enhance transformation from a fossil-based economy towards an economy using renewable resources by creating bio-based value-added networks. The project will connect Danube actors in a bio-based industry to minimize greenhouse gases and to optimize biomass resource utilisation. These measures are intended to improve the sustainability and regional development through diversification of the local economy while positively affecting the workforce. The focus on emerging transnational cooperation of clusters should serve to foster the bio-economy and eco-innovations and should lead to a strengthening of the regional economies.

The development of new bio-based value chains from primary production to consumer markets needs to be done by connecting enterprises from different regions and industries. However, due to a missing holistic transnational approach, the Danube actors in the current bio-based industry still operate disconnected and cannot properly

benefit from their potential. Therefore, the aim of this project is to develop new methods, strategies and tools to connect enterprises transnationally. Clusters represent groups of industries that are closely linked by common products, markets, technologies and interests. They are chosen to organize and carry forward the needed industry cooperation for the creation of new value chains. Properly performing clusters can help to upgrade industrial practices, generate new knowledge and contribute to regional policy-making.

The partners of the DanuBioValNet agreed that phytopharma, eco-construction and bio-plastic/advanced packing (bio-based packaging) have a high potential for improvement of their respective value chains and hemp is considered as a raw material suitable for all the three value chains. Project efforts are designed to allow partners to connect SMEs, farmers, universities, and research institutes within a value-added DanuBioValNet network. The partners intend to develop and implement a long-term, industry-driven roadmap for such collaboration along the entire value chain based on cluster partnerships for these processes. Focusing on the selected high potential sectors, and harnessing the nature of regional clusters within wider cross-regional selected value chains, DanuBioValNet will implement pilot actions, involving SMEs, universities, research institutions, policymakers, and civil society among others. The pilot actions serve as the prerequisite for creating a blueprint for cross-regional cooperation.

## LIST OF ABBREVIATIONS

<b>BBI JU</b>	Bio-Based Industries Joint Undertaking
<b>BIIE</b>	Bio-Based-Innovation Express
<b>BSO</b>	Business Support Organisation
<b>ca.</b>	Circa
<b>CBA</b>	Cost-Benefit Analysis
<b>CBD</b>	Cannabidio
<b>COSME</b>	EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises
<b>CSA</b>	Coordination and Support Action
<b>CZ</b>	Czech Republic
<b>EIP</b>	European Innovation Partnership
<b>ESIF</b>	European Structural and Investment Funds

<b>EU</b>	European Union
<b>ha</b>	Hectare
<b>H2020</b>	Horizon 2020 (EU programme)
<b>NCA</b>	National Cluster Association – CZ
<b>NGO</b>	Non-Governmental Organisation
<b>R&amp;D</b>	Research and Development
<b>SCAR</b>	Standing Committee on Agricultural Research
<b>SK</b>	Slovakia
<b>SME</b>	Small and Medium Enterprises
<b>S3</b>	Smart Specialisation Strategy
<b>THC</b>	Tetrahydrocannabinol
<b>VC</b>	value chain
<b>WP</b>	Work Package

## GLOSSARY

<b>Bioeconomy</b>	Bioeconomy is the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy. Its sectors and industries have strong innovation potential due to their use of a wide range of sciences, enabling and industrial technologies, along with local and tacit knowledge. (Source: European Commission (2012). <i>Innovating for Sustainable Growth: A Bioeconomy for Europe</i> , p. 3)
<b>Cluster</b>	Clusters are geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate. (Source: M. Porter (1998). <i>On Competition, Updated and Expanded Edition</i> . Harvard Business Review Book, p. 213)
<b>Cluster initiative</b>	Cluster initiatives are organised effort to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community. (Source: Ö. Sölvell, G. Lindqvist and Ch. Ketels (2003). <i>The Cluster Initiative Greenbook</i> , p. 9)
<b>Cluster organisation</b>	By a cluster organisation one should understand organised efforts to facilitate cluster development, which can take various forms, ranging from non-profit associations, through public agencies to companies. (Source: PricewaterhouseCoopers (2011). <i>Uncovering excellence in cluster management</i> , p. 6) Cluster management can be defined as the organisation and coordination of the activities of a cluster in accordance with certain strategy, in order to achieve clearly defined objectives. (Source: PricewaterhouseCoopers (2011). <i>Uncovering excellence in cluster management</i> , p. 3)
<b>Cluster Policy</b>	Cluster policy is an expression of political commitment, composed of a set of specific government policy interventions that aim to strengthen existing clusters and/or facilitate the emergence of new ones. Cluster policy is to be seen as a framework policy that opens the way for the bottom-up dynamics seen in clusters and cluster initiatives. This differs from the approach taken by traditional industrial policies which try (and most often fail) to create or back winners. (Source: European Commission (2016). <i>Smart Guide to Cluster Policy, Guidebook Series: How to support SME Policy from Structural Funds</i> , p. 11)
<b>Eco-innovation</b>	Eco-innovation aiming at significant and demonstrable progress towards the goal of sustainable development. Eco-innovation projects will therefore aim to produce quality products with less environmental impact, whilst innovation can also include moving towards more environmentally friendly production processes and services. Ultimately, they will contribute towards the reduction of greenhouse gases or the more efficient use of various resources. (Source: European Commission (2015). <i>Eco-innovation, When business meets the environment. FAQ: What is Eco-Innovation?</i> Online.)
<b>Smart Specialisation Strategies – S3</b>	Smart Specialisation is a strategic approach to economic development through targeted support for research and innovation. It involves a process of developing a vision, identifying the place-based areas of greatest strategic potential, developing multi-stakeholder governance mechanisms, setting strategic priorities and using smart policies to maximise the knowledge-based development potential of a region, regardless of whether it is strong or weak, high-tech or low-tech. (Source: Foray (2015). <i>Smart Specialisation, Opportunities and Challenges for Regional Innovation Policy</i> , Routledge.)
<b>Value Chain</b>	The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. A value chain refers to the full lifecycle of a product or process, including material sourcing, production, consumption and disposal/recycling processes. This also includes activities such as design, production, marketing, distribution and support to the final consumer. (Source: University of Cambridge (2017). <i>What is a value chain? Definitions and characteristics</i> . Online.)

## I. BACKGROUND AND RELEVANCE

### IMPORTANCE OF THE HEMP INDUSTRY AND ASSOCIATED SUPPORT

The cultivation and sourcing of biomass will give benefit to the EU's long-term economic growth and sustainability within the broader context of the regional bioeconomy<sup>1</sup>. Hemp is a unique multi-purpose plant that can be effectively grown in the Danube valley countries. Traditionally cultivated for its fibres, seeds and psychoactive substances, it is now considered to be an ideal crop for the development of innovative biomaterials<sup>2</sup>. It is one of the fastest growing crops, and it has a huge potential in different spheres of production due to the fact that almost the whole plant can be processed. It can be used in medicine, pharmacy, cosmetics as well as in construction, paper, plastics, textile and other industries.

Thus, the hemp-based bioeconomy topic has been included in the DanuBioValNet project with the vision to create and expand the opportunities for the value-added activities associated with the hemp industry. Following the vision of cross-sectoral cooperation of the DanuBioValNet project, hemp can be seen as a raw material for all three value chains on which the project is focused. In addition to hemp, these include phytopharma, bio-based packaging and eco-construction. In this regard, the hemp industry actors could get the opportunity to cooperate with other actors involved in the project.

### OVERVIEW OF THE HEMP INDUSTRY

**Cultivation of hemp in Europe.** The growing role of hemp for the transformation of regional/national economies has been recognized by many countries. While *Cannabis sativa indica* (medical hemp) contains two kinds of cannabinoids (THC - tetrahydrocannabinol that is psychoactive and CBD - cannabidiol), the *Cannabis sativa sativa* (industrial hemp) contains only the non-psychoactive CBD with many medical benefits and uses<sup>3</sup>. However, the possibility of hemp cultivation in individual countries is legally limited. Between 1993 and 1996, the cultivation of industrial hemp was legalised in most EU member states. In 2011, the cultivation area decreased to its lowest value of ca. 8,000 ha. After a continuous increase in the years 2012 to 2016, the cultivation area amounts now over 33,000 ha. Industrial hemp cultivation covers the largest area since the 2nd World War. The following countries are among the main hemp growers: France, the Netherlands, the Baltic Countries and Romania. In recent years, many European countries started or expanded their hemp cultivation, mainly to produce more hemp seeds for the health food market. Also, the hemp fibre sector is expanding, covering the increasing demand of other industries, such as the automotive industry. Investments and market growth are especially high in production of non-psychoactive hemp extracts and the

Cannabinoid CBD, which is used in pharmaceutical applications as well as in the food supplement industry. Here, a "patchwork" of regulations in Europe is a barrier for faster market growth<sup>4</sup>.

**The potential of the hemp industry in the Danube Region.** The hemp industry in the Danube Region consists of different actors covering the whole value chain from the growing and processing of industrial and medical hemp in a given country of the region to the R&D, education and promotion of the product as a commodity. The hemp value chain also consists of the development of new technologies and innovative applications, up to the manufacturing of final products. Nevertheless, the challenges and opportunities as well as missing links among the Danubian hemp industry stakeholders have not yet been properly identified. So, the role of the DanuBioValNet project partners is to identify the hemp stakeholders and enable them to meet, exchange and share information, and to facilitate their means of collaboration in the Danubian Hemp Cluster network. The development of the hemp industry can be then supported by specific policy measures, such as innovation and R&D grants / programmes.

1) European Commission. Strategy for "Innovating for sustainable growth: A bioeconomy for Europe", Brussels, 2012

2) AgriTec. MULTIHEMP - Multipurpose hemp for industrial bioproducts and biomass [online]. 02/2017. Available here: <http://www.agritec.cz/cs/multi hemp-multipurpose-hemp-industrial-bioproducts-and-biomass>

3) LeafScience.com. THC vs. CBD: What's The Difference? [online]. 11/2017. Available here: <https://www.leafscience.com/2017/11/22/thc-cbd-difference/>

4) EIHA. European Industrial Hemp Association. Press Release: Record cultivation of industrial hemp in Europe in 2016 [online]. 05/2017. Available here: <http://eiha.org/document/record-cultivation-of-industrial-hemp-in-europe-in-2016/>



**The EU regulations.** The cannabis plant is usually legally controlled when it is capable of producing a useable amount of the psychoactive substance delta-9-tetrahydrocannabinol (THC), but some countries control all strains, even those where the THC content is negligible. In the European Union, it is legal to cultivate and supply cannabis plants for hemp fibre if they have low levels of THC. But until now, there is no harmonised EU law on the cannabis use. The criminal or administrative response to drug

use offences is the responsibility of the EU Member States, not of the European Union. The granting of payments under the Common Agricultural Policy is conditional upon the use of certified seeds of specified hemp varieties; only varieties with a THC content not exceeding 0.2 % may be used (EU Regulation 1307/2013). The import of hemp is also subject to certain conditions to ensure the above-mentioned THC limit is respected (EU Regulation 1308/2013)<sup>5</sup>.

## II. WORKSHOP RESULTS

### OBJECTIVE OF THE ROADMAPPING WORKSHOPS

The objective of the Hemp Roadmapping Workshop was to bring together industry, technology and market experts, regulators and policymakers from the Danube Region countries to discuss the future goals, trends and upcoming legislation related to the development of the hemp industry. Discussions addressed the gaps in the hemp industry value chain and missing linkages between the Danube Region businesses and R&D.

Within the workshop, the future technological, societal, and market trends were discussed with the aim of identifying the best “road” to the desirable goals and inform the policy-makers how to improve conditions that currently hamper competitiveness and exploitation of opportunities along the hemp industry value chains in the region.

### APPROACH AND METHODOLOGY

The Hemp Roadmapping Workshop followed the steps recommended in the Roadmapping Workshop Methodology (WP3 A-3.4.) prepared by the project partners ICME, IPE and ANTEJA. All participants received the invitation, agenda and background paper (discussion paper) in advance, so that they had the opportunity to prepare themselves for discussions. In contrary to other value chain (VC) roadmapping background papers, the hemp background paper could not be prepared based on the previous mapping/analytical activities within the DanuBioValNet project (Synthesis Country reports, Synthesis Cluster Mapping Analysis, Synthesis VC Analysis) because the hemp

topic was added to the project after these activities had been completed (WP3). However, thanks to the Awareness Workshop for SMEs (especially dealing with the hemp industry) organised on 19 February 2018 in Prague by the National Cluster Association-CZ (NCA) adequate information was gained to enable the preparation of the paper. The Hemp Roadmapping Workshop was held on 24 April 2018 in Prague, Czech Republic, and moderated by Daniel Acs, the President of the PROUNION (SK). It was divided into three sections devoted to different topics. All participants got the opportunity to express their ideas and opinions on each of the topics.

### THE PARTICIPANTS OF THE WORKSHOP

The workshop was attended by 19 participants: 12 participants from the Czech Republic, 3 from Slovakia, 2 from Austria, 1 from Serbia and 1 from Croatia. The participants are the hemp experts

from private sector, national government bodies, academia, development and innovation agencies, and NGOs. The following table shows the structure of the participants:

Structure of participants	Clusters, cluster managers	SMEs	Research and academia	Public Body (BSO)	Policy Makers	Cluster Association	Total
Number of participants	3	4	4	4	2	2	19

<sup>5</sup>) European Monitoring Centre for Drugs and Drug Addiction (2017). Cannabis legislation in Europe [online]. Available here: <http://www.emcdda.europa.eu/system/files/publications/4135/TD0217210ENN.pdf>

At the beginning, Pavla Bruskova, the President of the NCA, welcomed the participants and Zuzana Polova, the Project Manager of the NCA, introduced the idea and activities of the DanuBioValNet

project. Then, the moderator of the thematic discussions, Daniel Acs, started the discussions on three specific topics:

**Topic 1:** Hemp as a perspective plant for various industry value chains in bioeconomy;

**Topic 2:** Creating conditions for boosting diversified and innovative hemp-based industries and R&D;

**Topic 3:** Hemp clusters as the drivers of the hemp-based bioeconomy in the Danube Region.

The participants expressed their attitudes and ideas and exchanged their experiences related to all of the aforementioned topics.

## WORKSHOP RESULTS

### Missing links and existing gaps (picture of today)

During the Hemp Roadmapping Workshop, several findings, missing links and gaps regarding the hemp industry were identified:

**Resource material and processing.** In general, there is a big potential for the hemp industry in the Danube Region. This is especially the case for hemp-based paper, medical use of hemp and hemp in automotive, insulation materials (Austria) and textile were also highlighted in the workshop discussions. Being one of the fastest growing crops, hemp has also potential as a biomass for the energy sector. The number of companies focused on hemp is growing (Serbia); there are also specialised associations of hemp stakeholders (Croatia, Slovakia, Czech Republic) and programmes for development of bio-based products (Austria).

The workshop identified the weaknesses of the hemp industry, such as a lack of resource material (feedstock), relatively low quality of hemp for different industrial applications and the missing regional technological infrastructure for post-harvesting hemp processing. The quality of hemp depends on special varieties of the hemp plant, which requires creation of demand and also R&D-based seed breeding processes. Also, the natural and climate conditions influence the hemp quality in terms of its specific type of exploitation. That is why the agro-industrial linkage is crucial.

The representatives of the Czech hemp companies expressed the need for availability of a technology for the production of high-quality hemp fibres (big machines for the hemp stem processing). The current insufficiency in terms of the quality of hemp fibres in the Czech Republic leads to their import from the Western European countries, such as the Netherlands). The scope of the Czech Hemp Cluster activities could help change this situation.

**Legal limits and policy issues.** The workshop participants mentioned the following issues: regulations in the hemp industry are not harmonized, e.g. there is no common standardisation of the hemp industry as well as legal limits of hemp growing and content of cannabinoids in the hemp-based products (hemp seed oil, food, cosmetics, etc.). The allowed safe content of THC in food, for example, is not officially defined in the Czech Republic.

A clear and consistent regulatory environment is important for investors and for the enabling of the export/import activities among the European and non-European countries. The foreign investors in R&D, for example, need to know that the regulatory environment is clear and well set up. Thus, the cooperation among hemp experts and national as well as EU bodies is necessary for the creation of adequate regulations, standards and overall framework conditions for the advancement of the hemp industry.

So far, national governments and policy makers are not sufficiently aware of the bioeconomy approaches, and thus lack support to diverse industrial sectors, such as conceptual/financial support for the hemp industry. Also, they are not actively contributing to the existing EU bioeconomy structures/bodies (e.g. Bio-based Industries Consortium, BBI JU) and their respective debates. The hemp growing, processing, exploiting and supporting are still not legally effective activities in many European countries. Hemp is not yet among the strategic plants of the national bioeconomy priorities. This requires further activation and lobbying on this issue with the policymakers. On the other hand, the situation concerning medical cannabis in the Czech Republic is fully controlled by a special state agency according to the European rules.



Other legal and policy issues were mentioned regarding the European and national policy documents, programmes, initiatives and opportunities for financial support of bioeconomy activities and related cooperation. These included the following:

- The Bioeconomy Strategy<sup>6</sup> – the participants expressed a recommendation for policy makers to be active in commenting/development of the EU Bioeconomy Strategy Action Plan;
- Bio-based Industries Joint Undertaking (BBI JU) – opens the calls<sup>7</sup> for the support of bioeconomy (deadline - beginning of September 2018);
- The V4 BioEast initiative – is open for cooperation of clusters, research organisations, policy makers, and others;
- Standing Committee on Agricultural Research (SCAR) Bioeconomy. The participants offered a recommendation that the policy makers engage in and/or become members of the Strategic Working Group for the SCAR Bioeconomy;
- CzechInvest – there is a programme on technology transfer with possible cooperation on the hemp topics (involving national funds and a technology transfer programme). The support is designed for the business entities registered in the Czech Republic.

**Educational issues.** The participants of the road-mapping workshop agreed that the education and awareness building are among the most important activities for the current and future development of the hemp industry. Nowadays, there is no available “good” educational programme on the difference between cannabis use in medical and pharmaceutical industries (THC, CBD) and technical hemp used in textile, paper, construction, cosmetics, automotive, and other applications. Neither is there an access distinction among students, government, health care providers, police and the society in general. The missing training programmes and awareness events for different target groups could be developed and delivered by universities, clusters and/or R&D organisations.

The current Czech governmental drug prevention programmes only teach the public that cannabis is a drug, which systematically builds the fear and barriers against cannabis use and hampers the pursuit of positive aspects such as innovation, business, economy/bioeconomy and health. That is why it is very important to include the education and awareness building in the hemp cluster activities. This must start at the governmental level with the people responsible for the Drug prevention programme. Such initiatives will help communicate the different purposes of the hemp use properly showing both positive and negative aspects of the cannabinoids (THC, CBD).

The education of people on the opportunities of the exploitation of hemp will also help the overall development of hemp industries and businesses. People will become more knowledgeable about the hemp-based materials and products. As a result, the need of experts on hemp education was highlighted during the workshop and the current lack of such persons was identified as a significant gap.

**Research.** There are universities and institutes dealing with the research, seed breeding, post-harvest processing of hemp and other fields in the Danube Region (Czech Republic and Slovakia). According to the participants, there are current problems associated with the lack of research on the quality of hemp fibres and the transfer of such results into practise. Based on the debate on the topic, the workshop participants concluded that there are certain capacities for R&D on the medical use of cannabis. Generally, there is a huge gap between the potential of hemp utilisation and its practical use. Hemp fibres cannot be used only in textile, construction and automotive industry but also in medicine. However, there is no research and medical/clinical trials done. Currently, there are some excellent research “units” concentrated on a single hemp-related issue but not on a complete hemp value chain. For this reason, transnational cooperation is needed. The R&D activities along the whole hemp industry value chain reflect the future challenges for the hemp clusters in the Danube Region and their cross-sectoral and cross-regional cooperation. The participants of the roadmapping workshop also recommended collecting the data about the existing research studies to show the potential of hemp industries for business, as well as for clinical/medical evidence of the health benefits of hemp-based products.

**Medical aspects of hemp.** The use of cannabis for medical purposes is a significantly growing trend. Nowadays, pharmaceutical companies are very interested in the possibilities of cannabis utilization in medicine as well as in cosmetics and are willing to invest their money in these fields. Czech clinics are open to testing medical products from cannabis (pre-clinical and clinical trials) to prove any associated health benefits. However, at the moment there is still controversy about the impact of hemp-based products on health. It is also important to define the regulatory environment for pursuing the identification of all bioactive compounds in the cannabis extract. The other hemp-based products, such as cosmetics (gels, oils) and food, do not need the same regulatory approval as medications but must be rather tested for safety.

6) Available here: <https://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=strategy>

7) Available here: <https://www.bbi-europe.eu/participate/call-proposals-2018>

**Trends and upcoming developments (picture of tomorrow).** Hemp is a multipurpose plant and can be used in many different industries and its popularity is growing.

**Technology and application.** The use of hemp as a raw material input will continue to be promising especially for paper-based applications through the mixing of different fibres. It will also be important in construction (hemp-concrete), food and pharmaceutical industry. The technology development in the area of hemp depends on the availability of the post-harvesting processing technologies which can influence the quality of hemp fibres. Currently, the regional technological infrastructure capacity is not sufficient in terms of quantity and quality. The growers of hemp are mainly small-sized companies/farmers who need to aggregate their resources to be able to buy or modernise their technology infrastructure. The future perspective of the industry depends on the availability of better/state-of-the-art technology infrastructure and willingness of hemp companies to cooperate. With this vision, the role of hemp clusters will become more important for the Danube Region.

**Markets.** The hemp market is still in the process of establishing itself in the Danube Region. Due to the existing gaps in the regulatory environment and standardisation of hemp products, it is difficult to develop the market not only on the national but also on the international level. The educational programmes and awareness building is a way to support and extend the market of hemp-based products. Companies, hemp associations and cluster organisations should communicate the importance and usefulness of hemp and build awareness with regard to the positive and negative aspects of hemp production and usage.

The hemp-based products have the potential to become more and more popular for end consumers because they are “bio-based”, ecological and environmental friendly. They could have also a positive impact on health (healthier living) and sustainability of the whole planet. However, the official research on benefits of hemp products is still missing as well as the cost-benefit analysis (CBA) of the bio-based market. The CBA would help significantly because it could show the potential of hemp industries for business stimulation and prove real, data-based economic benefits.

The future perspective of the hemp market depends on the establishment of the regulatory environment by national governments, broad awareness building and education on hemp issues. This is a long-term task for policy makers, hemp associations, hemp clusters and companies to push these activities forward.

**Socio-economic factors (legal, economic, social conditions).** The hemp industry is specific. There are relatively small-sized companies in its value chain. The future economic growth depends on their willingness to work together and the extent of their openness to the external investment. The national support is also important. The social conditions are determined by the public opinion on hemp in general. Until the education programmes and awareness campaigns are well set up, the public opinion on hemp will be more negative and reserved. The public knows hemp/cannabis mainly as a drug. The development of hemp cluster initiatives, establishment of hemp cluster organisations and their collaboration in the Danube Region would foster the improvement of all economic and social conditions of the hemp industry and thus bioeconomy in the future.

**Policy/Business environment.** The future of the hemp industry in the Danube Region also depends on setting up unified regulation, certification and legislation at the EU level. The top-down approach is necessary for the support and development of the hemp industry. There are many financing instruments to be used for all levels of bioeconomy (from policy makers, to clusters and SMEs). Examples of these instruments include the following:

- National ESIF (structural funds (mainly programmes for Research and Innovation, but also educational programmes (ESF));
- Rural Development Programme (the measure 16 - Cooperation including EIP and establishment of Operational Groups in the hemp industry);
- INTERREG programmes focused on transnational cooperation and networking, policy and tool developments as well as training programmes and awareness events;
- H2020 - small grant schemes for SME under running bio-based projects;
- H2020 - CSA support for development of Bioeconomy Strategy;
- H2020 - Multi Actors projects (cooperation of established Operational Groups under EIP);
- BBI JU - small grant schemes for SME;
- COSME - projects for SMEs and clusters;
- H2020 - SME instrument.

**Main challenges and constraints identified.** To sum up, the following are the main challenges identified:

- to set up regulatory environment and harmonisation/standardisation of hemp-based products,
- to incorporate hemp in bio-based (bioeconomy) national/regional strategies,
- to create joint educational and training programmes on hemp for broad spectrum of target groups,
- to support the hemp research and their cross-sectoral and transnational cooperation,

- to help with technology infrastructure capacity building in regions,
- to support the hemp industry at the national levels,
- to mobilise the hemp-focused experts.

#### **Cross-sectoral business opportunities to overcome identified missing links**

The hemp industry offers a great opportunity for cross-sectoral business cooperation because the hemp plant is a natural feedstock for many different industries. Companies from the hemp-based value chains can find common targets for mutual collaboration in joint innovation projects. The hemp cluster initiatives can bring the hemp actors together and facilitate their cross-sectoral cooperation to overcome missing links and strengthen their performance internationally.

#### **The role of such hemp clusters is:**

- to connect actors in the hemp industry and bring them together – discuss the topics of collaborative projects and provide the professional management,
- to facilitate international cooperation,
- to provide services to hemp-farmers and hemp-processing businesses, and connect them with the research,
- to lobby for specific issues of different hemp-based value chains (textile, construction, bioplastics, cosmetics),
- to lobby for the common issues of the hemp cluster regarding the growing standards of hemp and regulatory environment for hemp-based extracts and products,
- to employ suitable funding schemes and support nationally and at the EU level,
- to cooperate with the public sector on the awareness-building and education (incl. creation of a joint e-learning system).

### **III. RECOMMENDATIONS AND INPUTS FOR WP4, WP5 AND WP6**

#### **WP4 JOINT BIO-BASED INDUSTRY CLUSTER POLICY STRATEGY**

Initial steps toward bioeconomy development and support of the hemp industry should be based on a top-down approach. The policy makers in cooperation with hemp experts need to define the strategy, regulations, new bioeconomy-focused programmes and financial instruments for the actors in the entire value chain of the hemp industry.

#### **Regarding the recommendation for policy makers, the following issues to be addressed:**

- Awareness building and education on hemp issues including its role in bioeconomy;
- Inclusion of hemp in the strategic bioeconomy feedstocks;
- Bridging the agro-industry value chain development in a comprehensive way, i.e. to get the commitment of the Ministry of Agriculture (growing part of hemp-based value chain) and Ministry of Economy/Industry and Trade (processing part of hemp-based value chain) by establishment of an inter-sectoral platform, such as a National bioeconomy platform;
- Maintaining and balancing the hemp feedstock supply/demand in a long-term perspective based on the National bioeconomy strategy and Action plan;

- Support of regional hemp growers and processing businesses through a targeted funding programme calls for enabling the consolidation, growth and modernisation of the hemp industry, its technologies and relevant research and development;
- Cooperation of hemp clusters with universities in the inclusion of bioeconomy topics in the curricula and preparation of human resources for hemp business practices;
- Activation of the representation of Danube countries in the European bioeconomy/hemp infrastructure/bodies, contribution to the EU Bioeconomy Strategy and engagement or membership in the Strategic Working Group for SCAR Bioeconomy;
- Taking an active role in the commenting/development of the EU Bioeconomy Strategy Action plan and initiation of national/regional bioeconomy strategies;
- Active participation in BIOEAST initiative with presentations on topics related to hemp.

The feasibility of the recommendations is long-term.



## WP5 OPEN SPACE INNOVATION ARENAS AND NEW CLUSTER MANAGEMENT SERVICE

The workshop's findings highlighted the growing trends of using natural resources ("bio" and "eco" labels of products are attractive for customers) and many funding possibilities for the bio-based industry at national and international levels. The new cluster services should focus more on searching for funding instruments and schemes for bio-orientation of their projects and eco-innovations of their products (there is variety of

programmes, funds and private money available). Furthermore, learning programmes and trainings on bioeconomy topics (raising awareness on hemp and opportunities of its utilisation) could be provided by cluster managers to their members as a new cluster service. The mediation of the cross-sectoral cooperation in hemp clusters is also a way how to accelerate the innovations and improve competitiveness of this bio-based industry.

## WP6 PILOT ACTIONS

Hemp is a unique plant which can be used as a raw material input for all value chains on which the DanuBioValNet project is primarily focused (Phytopharma, Bio-based Packaging, and Eco-Construction). So, there is a huge potential for "cross-sectoral" cooperation. Based on the knowledge of the present situation in the hemp cluster initiatives in Slovakia and the Czech Republic, the outcomes and debates within bioeconomy awareness and hemp roadmapping seminars (Prague) and the 3rd training workshop (Opatija), the following ideas for the pilot actions were identified:

- Mobilisation of the hemp sector actors across the Danube region by each partner, inviting them to the Open Space Innovation Arena event and letting them meet with suitable actors of other VCs (Phytopharma, Bio-based Packaging, Eco-Construction). This will allow them to identify their interests in future collaboration, including both horizontal (education, legislation, standardisation, etc.) and vertical (hemp growing, processing, R&D, manufacturing, etc.) topics.
- Preparation of an Input paper for the Policy Learning Arena devoted to the hemp industry to launch a better understanding of the bioeconomy concept and its demonstration via the revival of the hemp industry in the Danube region.
- As recognised by the project partners so far, the awareness of bioeconomy in the Danube countries is very low. That is why a more targeted promotion of bioeconomy with the help of the

DanuBioValNet project could be launched. An initiative, e.g. a Danube Bioeconomy Awareness Offensive, could cover the relevant ministries (agriculture, economy, industry, environment, local development) with the information about the EU bio-based actions, documents, achievements to stimulate the National bioeconomy strategies to develop. As the first step, the creation of National Bioeconomy Platforms could be realised in order to engage the relevant policy makers, experts and clusters together to contribute to the Joint Bio-based Industry Cluster Policy Strategy.

- To apply the Policy Stress Testing methodology on the hemp value chain support (relevant funding programmes, grants, calls, etc.) and to identify the reflection of the hemp value chain in the Smart Specialisation Strategies (S3) at the national level in the partner countries.
- To demonstrate the necessity of smart cluster policy adoption in the partner countries, which will provide a unified methodology and rules on cluster mapping, facilitation of cluster actors and cluster organisation establishment. As a model, the Czech best practice cluster support programme could be applied to a common process of the hemp cluster initiative development and hemp cluster organisation establishment. The Policy Learning Arena can serve as a framework for this best practice transfer, followed by the Bio-Based Innovation Express – BIIE scheme.

The Roadmap Report Hemp Value Chain was created by:

**National Cluster Association**

U Tiskarny 616/9, 702 00 Ostrava, Czech Republic

[www.nca.cz](http://www.nca.cz)

[info@nca.cz](mailto:info@nca.cz)