



Cluster Mapping Synthesis Report Phytopharmaceutical Industry

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

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

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INTRODUCTION

Phytopharmaceuticals are herbal medicines whose efficacy is down to one or several plant substances or active ingredients. They have been used for treating diseases since time immemorial. This traditional knowledge is still the basis for many medicinal products made from plants or parts thereof¹.

Globally, herbal medicine has been considered an important alternative to modern allopathic medicine. Although the herbal medicines are very popular in the society, only few medicinal herbs have been scientifically evaluated for their potential in medical treatment. In most countries, the herbal drugs are poorly regulated and are often neither registered nor controlled by the health authorities.

Herbal medicine products include herbs, herbal materials, herbal preparations, and finished herbal products that contain parts of plants, other plant materials, or combinations thereof as active ingredients². Herbs include crude plant material, for example, leaves, flowers, fruit, seed, and stems. Herbal materials include, in addition to herbs, fresh juices, gums, fixed oils, essential oils, resins, and dry powders of herbs. Herbal preparations are the basis for finished herbal products and may include comminuted or powdered herbal materials, or extracts, tinctures, and fatty oils of herbal materials. Finished herbal products consist of herbal preparations made from one or more herbs.

Since the end of the 20th century, plant-based drugs regained popularity due to the often serious effects of synthetic drug substances. The pharmaceutical industry and academic institutions have made considerable contributions to the progress in medicinal plant research. Even though plant-based remedies have special legal status in many countries, they can be considered equal to synthetic drugs in terms of their quality, safety and efficacy standards. The special status of botanical medicines is due to their complex composition and the resulting challenges for analytical methodologies and activities tests³.

In Europe, for the marketing approval⁴, the herbal preparations are classified in three categories as follows:

- Traditional medicinal use provisions (“traditional use”) accepted on the basis of sufficient safety data and plausible efficacy
- Well-established medicinal use provisions (“well-established use”) demonstrated with the provision of scientific literature establishing that the active substances of the medicinal products have been in well-established medicinal use within the European Union for at least 10 years, with recognized efficacy and an acceptable level of safety a product can be classified under
- Safety and efficacy data from the company's own development (“stand alone”) or a combination of own studies and bibliographic data

The DanuBioValNet project is aiming at establishing bio-based industry networks across the Danube Region. A better understanding of the phytopharmaceutical cluster landscape is essential to initiate transnational cooperation of clusters to foster bioeconomy and eco-innovations and in order to lead to a strengthening of the regional economies.

For purposes of the DanuBioValNet⁵ project, data collection and cluster mapping of the phytopharmaceutical industry have been defined as “health-related products derived from plant sources”. While some definitions may specify a minimum number of bioactive phytochemical compounds, the DanuBioValNet interest is an understanding of the value-added activities associated with producing pharmaceutical and cosmeceutical agents of plant origin. These include bio-active ingredients for pharmaceutical grade medicines, natural herbal medicines, cosmetics, cosmeceuticals, nutraceuticals, nutritional supplements and similar health-related natural products. It is understood that varying degrees of regulatory compliance applies in accordance with the nature of the phytochemical compounds, their applications, safety profile and health claims.

1) “Phytopharmaceuticals – fighting disease with natural substances”, <https://www.gesundheitsindustrie-bw.de/en/article/dossier/phytopharmaceuticals-fighting-disease-with-natural-substances/>.

2) World Health Organization General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine. 2000. http://www.whqlibdoc.who.int/hq/2000/WHO_EDM_TRM_2000.1.pdf.

3) Wichtl, Max (ed.), 2004, Herbal Drug and Phytopharmaceuticals – a Handbook for Practice on a Scientific Basis, Medpharm Scientific Publishers, Stuttgart.

4) European Medicines Agency Herbal Medicinal Products, http://www.ema.europa.eu/ema/index.jsp?curl=pages/regulation/general/general_content_000208.jsp#.

5) <http://www.interreg-danube.eu/approved-projects/danubiovalnet>

THE CLUSTER MAPPING APPROACH

Clusters can be understood as regional concentrations of economic activities in related industries connected through local linkages and spill-overs, have long been known to be a feature of market economy⁶. Cluster organisations can help firms to better engage with other local actors within their cluster and to organise collective actions to strengthen the local context. Moreover, they can reduce the transaction costs for firms, especially SMEs, in building linkages to firms and collaboration partners in other locations.

Clusters have a distinct geographic dimension, reflecting the dynamics of local spill-overs. They are also deeply embedded in a broader geographic context: they serve markets elsewhere and are connected to other clusters with complementary strengths in regional, interregional or global value chains. This mirrors the role of location for firms: while local conditions provide the unique context for building distinct capabilities and strategic positions, national and international linkages are critical to access other markets, suppliers, and collaboration partner.

Cluster mapping describes the process of measuring the presence of cluster actors in a given region across defined sector-specific value chains. Cluster mapping, especially in Emerging Industries like Phytopharmaceutical, is of high relevance to better understand the key competences of the cluster actors as well as to review to what extent the respective value chain is properly covered.

This report provides the first perspective on Phytopharmaceutical clusters across the Danube Region. One key novelty is the introduction of firm-level data to supplement the statistical data from national and EU statistical offices. This firm-based data significantly increases the robustness of the data, especially in countries like Germany that collect regional data through samples rather than reporting by all firms. It also enables performance of individual firms to be tracked over time, gaining more granular insights into patterns of entrepreneurship.

The report is based on a new dataset that is compiled specifically for analysing detailed patterns of cluster evolution. The core of the dataset is the firm- and plant-level data sources from the Orbis Historical dataset supplied by Bureau van Dijk (June 2016 release). This dataset provides detailed data on the economic performance of firms. It allows the usage of data of firms' turnover, wage bill, capital, materials and employment⁷, totalling more than 1 billion data points.

The coverage is very good in most countries in Europe, and especially for larger limited liability companies. However significant gaps were still present.

In this report **strong clusters** are being determined by giving a "Cluster Star" for each region being identified to belong to the top 20 % of European regions in the following dimensions:

- **Specialisation**, measured by the relative size of regional employment in the Phytopharmaceutical sector reflected in its location quotient (LQ). This relative measure indicates how much stronger a region is in the Phytopharmaceutical sector than it would be expected, given its overall size, compared to the average employment size in the Phytopharmaceutical sector across all regions
- **Absolute size**, measured by the number of employees and establishments. This measure is based on the observation that the number of linkages within a cluster is growing exponentially with the number of participants. Only when economic activity in the Phytopharmaceutical sector moves beyond a threshold of critical mass do cluster effects become significant.
- **Productivity**, measured by the wages paid in a Phytopharmaceutical cluster (adjusted for local cost levels). This measure reflects not only what is being done in a region, but how well it is being done, influenced by the strength of cluster effects. Wages are also influenced by the structure of labour markets and other factors but are strongly correlated with productivity.
- **Dynamism**, measured by a simple average of measures on employment growth and the presence of fast-growing new firms (gazelles). This measure aims to capture whether a Phytopharmaceutical cluster continues to benefit from strong cluster effects in its development or not. The cluster may be hindered in its growth because it has already reached a level where costs or other factors, such as industry-specific growth trends⁸, are greater than the benefits.

The notion of regions is applied in this report by using data for specific administrative regions, generally at the so-called NUTS 2 level. For this report, 252 European regions have been regarded,⁹ each with its own profile and economic performance. These regions are used as a pragmatic choice because they are likely to encompass the "economically relevant" regions; there is data available, and in most cases there is some level of government that can take action for this specific region.

6) Christian Ketels (2017). Cluster Mapping as Tool for Development, Harvard Business School, http://www.hbs.edu/faculty/Publication%20Files/Cluster%20Mapping%20as%20a%20Tool%20for%20Development%20_%20report_ISC%20WP%20version%2010-10-17_c46d2cf1-41ed-43c0-bfd8-932957a4ceda.pdf.

7) Employment is usually the only variable available on plant level, the rest are for the firm as a whole.

8) European Cluster Observatory, 2016.

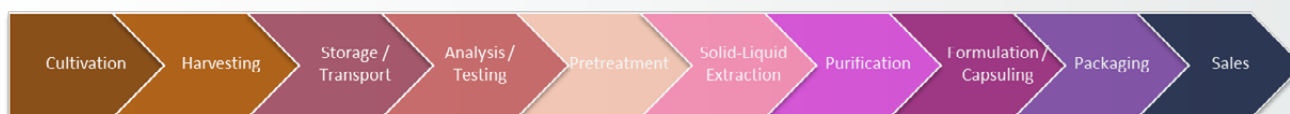
9) The analysis covers all EU-28 countries (comprising 276 NUTS-2 regions) as well as Albania, Bosnia and Herzegovina, Iceland, FYROM, Kosovo (regarding the political status of which no claims are implied), Montenegro, Norway, Serbia, and Switzerland, by applying the NUTS (Nomenclature of Territorial Units for Statistics) standard for the subdivisions of countries for statistical purposes.

METHODOLOGY TO DEFINE THE COMPOSITION OF THE PHYTOPHARMACEUTICAL SECTOR

The operationalisation of the Phytopharmaceutical sector was developed within the DanuBioValNet project by an active involvement of the partners and cluster managers. This became necessary since the composition of this sector was unknown before. In a first step, the characteristic Value Chain for the Phytopharmaceutical sector was been

jointly developed with the partners (Figure 1). The first node can be “cultivation” in case the raw materials can be cultivated. Or, the node can be defined by “collected”, in case the raw material has to be collected in the wild. However, all the following nodes of the Value Chain remain the same.

Figure 1: Value Chain for Phytopharmaceutical Sector (source: DanuBioValNet)



In a next step, all partners and related cluster managers did a detailed mapping of their phytopharmaceutical cluster initiatives and clusters in their region according to the pre-defined Value Chain¹⁰. For this purpose the members of the identified cluster initiatives and clusters were grouped by project partners and cluster managers according to the specific nodes of the Phytopharmaceutical Value Chain they operate in. In those cases, where no cluster initiatives existed, key cluster actors were identified and grouped.

In a third step, the specific NACE industry classifications¹¹ for all members or cluster actors were identified as part of the cluster mapping exercises, that allowed to produce a reliable picture of the Phytopharmaceutical industry. The Phytopharmaceutical industry composition

illustrated in Figure 2 is based on the intensive work of the project partners and related cluster managers and is based on more than 300 companies and their related NACE classifications identified. The size of the different boxes (NACE classifications) is proportional to the number of enterprises. As Figure 2 illustrates the biggest share of enterprises (about 18 %) operate in the sector “Manufacturing of basic pharmaceutical products” (NACE Code C21.10). 6 % of the enterprises deal with “Growing of spices, aromatic, drug and pharmaceutical crops” (NACE Code A1.28).

It has to be mentioned that the current NACE Code classification cannot sufficiently distinguish between the Phytopharmaceutical and the Pharmaceutical sector. Thus, some overlapping between both sectors is likely to exist.

Figure 2: Phytopharmaceutical industry composition based on NACE industry classification 2008 (source: DanuBioValNet)



10) Further details of the individual cluster mapping exercises are given in the regional cluster mapping fact sheets available on the DanuBioValNet website (interreg-danube.eu/danubiovalnet)

11) according to NACE Rev. 2 2008; Eurostat – Methodologies and Working Papers (2008), ISSN 1977-0375

OVERVIEW

The Phytopharmaceutical industry in the Danube Region employs more than 1.5 million workforces and provides 30 % of all sector-specific jobs in Europe. Furthermore, almost half of all firms operating in this sector are based in the Danube Region (42.9 %), which demonstrates the strong role of the Region compared to Europe. Around

25.000 new jobs have been created by young, high growing companies (by so called Gazelles). Higher dynamics in terms of increased number of firms compared to all Europe can be found, whereas growth in term of employment and productivity was lower.

Table 1: Basic facts of Phytopharmaceutical industry in the Danube Region compared to Europe

	Danube Region		Europe	
	Level in 2014	Change since 2008	Level in 2014	Change since 2008
Employment	1,529,292	1.4 %	5,100,742	0.7%
Establishments	535,517	33.0%	1,249,705	16.2%
Average Wage (EUR)	20,197	-3.2%	30,787	2.9%
Gazelle Employment	24,676	1.7%	87,023	-0.2%

The Danube Region¹² is well positioned in this sector since 25 regions have at least two or more Cluster Stars (39.7 % of all Danube Regions). Furthermore,

48 % of all European regions with two or more Cluster Stars are located in the Danube Region.

Table 2: Comparison of Cluster Stars between the Danube Region and Europe.

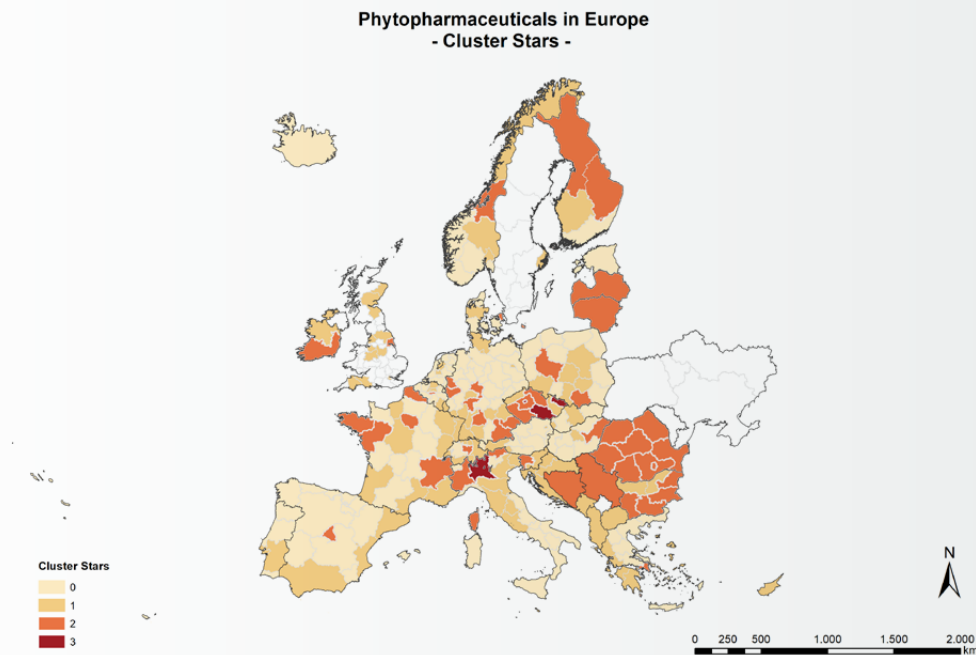
Region	No Star	1 Star	2 Stars	3 Stars	4 Stars
Danube	18	20	22	3	0
Rest of Europe	132	73	26	1	0

Figure 3 profiles all European regions according to the Cluster Stars in the Phytopharmaceutical industry. The strong regions are spread rather across Europe with the largest concentrations

in Bulgaria, Czech Republic, Germany, France, Romania and Slovenia, whereas the strongest once are located in the Czech Republic and Italy (Lombardy). More details are given in Appendix I.

12) 63 Member Regions, no data for Ukraine (4 NUTS-2-Regions) and Moldavia (1 NUTS-2-Region)

Figure 3. European top regions in Phytopharmaceutical Industry (Cluster Stars, 2014)¹³

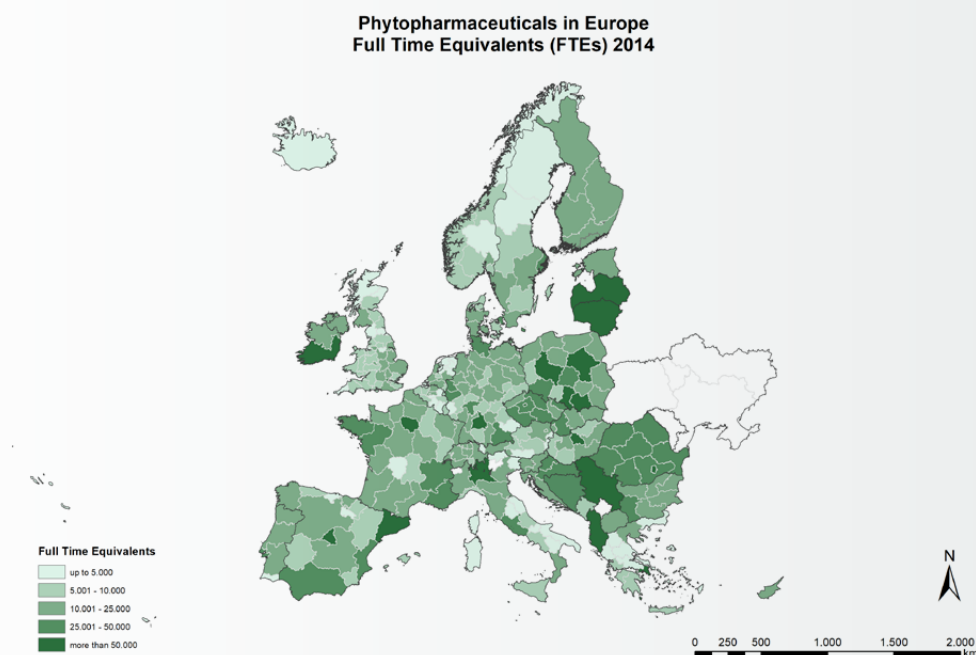


EMPLOYMENT

Figure 4 illustrates the employment pattern in the Phytopharmaceutical Sector in Europe. This pattern shows many regions all over Europe employing more than 50,000 workforces. Southern and Eastern Ireland, Praha region, Île de France,

Stuttgart region and Attiki employ 10.1 % of all European workforces in the Phytopharmaceutical sector. Four Danube regions belong to the top 15 regions, including Bucharest and Belgrade region (s. Table 3).

Figure 4: Leading European regions in Phytopharmaceutical industry (Full Time Equivalents, 2014)



13) No data available for Sweden and parts of UK

Table 3: Top 15 European regions with highest number of employment in the Phytopharmaceutical sector (Full Time Equivalents, 2014)

NUTS	Region	Employment (FTE)	NUTS	Region	Employment (FTE)
IE02	Southern and Eastern Ireland	113,067	ITC4	Lombardy	71,923
CZ01	Praha	110,710	ES30	Madrid	69,844
FR10	Île de France	105,476	LV00	Latvija	59,403
DE11	Stuttgart	93,632	PL22	Slaskie	59,158
EL30	Attiki	91,794	PL41	Wielkopolskie	56,149
RO32	Bucuresti - Ilfov	79,012	LT00	Lietuva	55,627
PL12	Mazowieckie	76,233	HU10	Kozep-Magyarország	54,871
ES51	Cataluña	75,513			

ENTERPRISES

Comparing the enterprise pattern across Europe (Figure 5), similarly strong national patterns as in the leading clusters map in Figure 2 can be found. The Czech Republic, France, Romania, and Spain host most enterprises. Especially the Czech Republic can be considered to be very strong in this regard since almost 10 % of all enterprises in the Phytopharmaceutical sector are located in this

country (s. Table 4) producing phytopharmaceutical products like herbal essences and extracts for pharmacy, cosmetics and food industry; wide range of hemp products for bio-food shops, pet-shops, and restaurants, whereby partially the raw materials are sold too. However, many other Danube Regions are comparable strong in this regard, too.

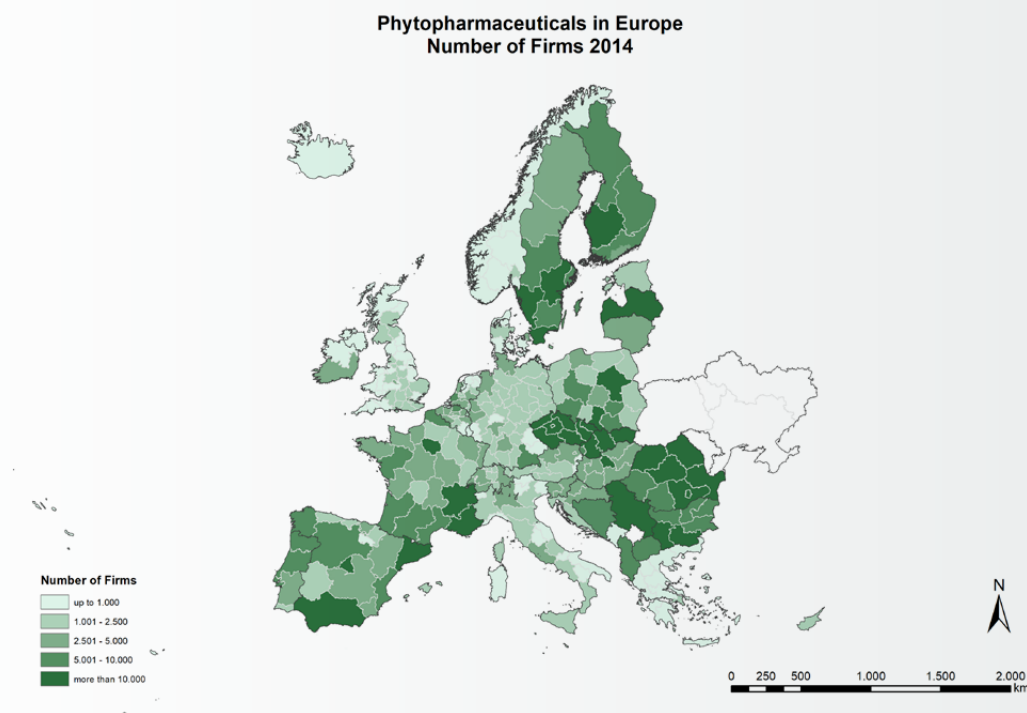
Figure 5: Leading European regions in Phytopharmaceutical industry (Enterprises, 2014)

Table 4 illustrates the top regions in terms of number of enterprises. Praha region is the only region that is among the top 5 in both, number of employees and number of enterprises. This can be explained by the significantly different sizes of the companies across the regions. Whereas enterprises

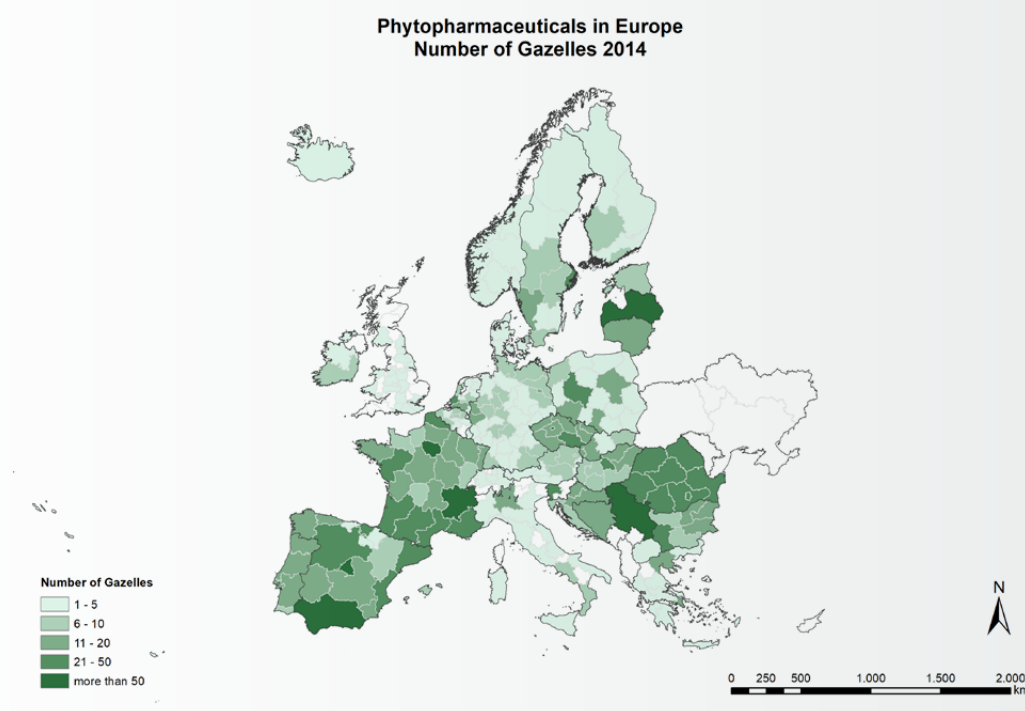
in Southern and Eastern Ireland, Stuttgart or Athens region employ more than 25 Full Time Equivalents on average (FTE), comparable lower figures can be found in Romania (3,1 FTE), Bulgaria (1,8 FTE), the Czech Republic (1,7 FTE), Austria (3,1 FTE) or Slovenia (4,2 FTE).

Table 4: Top 15 European regions with highest number of enterprises operating in the Phytopharmaceutical sector (Enterprises, 2014)

NUTS	Region	Enterprises	NUTS	Region	Enterprises
CZ01	Praha	49,256	CZ07	Stredni Morava	19,083
CZ06	Jihovychod	32,258	RO21	Nord-Est	18,487
FR10	Île de France	26,959	ES30	Madrid	18,290
CZ05	Severovychod	26,727	CZ08	Moravskoslezsko	18,030
ES51	Cataluña	24,270	RO32	Bucuresti - Ilfov	17,602
CZ03	Jihozapad	21,499	RO31	Sud - Muntenia	16,845
CZ02	Stredni Cechy	19,935	FR82	Provence-Alpes-Côte d'Azur	16,542
BG41	Yugozapaden	19,618			

Firm-level data has been used to also identify so-called “Gazelles”¹⁴. Due to the novelty of this data source and differences in coverage across countries, the results have to be interpreted with caution. In particular, it seems likely that country-specific rules and regulations, for example on

taxation, have an important influence on the presence of new business formation that is not directly linked to the overall dynamism of the economy. However, the reader might consider these data to be interesting.

Figure 6: Leading European regions in Phytopharmaceutical industry (Gazelles, 2014)

There are more than 958 Gazelles in the Phytopharmaceutical sector in the Danube Region employing 24,837 workers. Regions like Praha or Île de France are, again, under the top 5 regions

(Table 5). But also other regions from the Czech Republic, Romania and Bulgaria have a significant number of Gazelles.

14) Gazelles are defined here as companies less than 5 years old that have grown their employment at least 10% annually over a period of three years

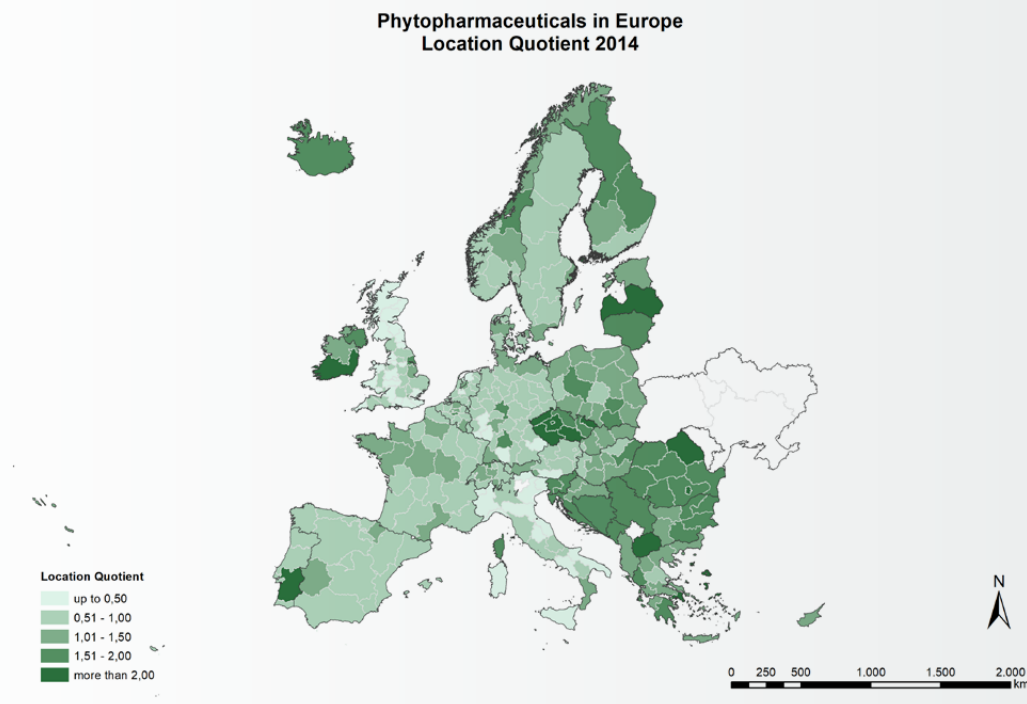
Table 5: Top 15 European regions with highest number of enterprises operating in the Phytopharmaceutical sector (Gazelles, 2014)

NUTS	Region	Enterprises	NUTS	Region	Enterprises
CZ01	Praha	136	CZ06	Jihovýchod	40
FR10	Île de France	75	HU10	Közép-Magyarország	38
ES61	Andalucía	71	BG41	Yugozapaden	37
ES30	Madrid	59	RO32	Bucuresti - Ilfov	36
FR71	Rhône-Alpes	53	RO22	Sud-Est	35
LV00	Latvija	51	RO42	Vest	35
ES51	Cataluña	47	RO21	Nord-Est	34
ES52	Valencia	43			

REGIONAL SPECIALISATION

Measuring regional specialisation of the Phytopharmaceutical industry can provide interesting insights to what extent a region is stronger than would be expected in this sector given its overall size, compared to the average employment size in the Phytopharmaceutical sector across all regions. Regional Specialisation can be

measured by the Location Quotient (LQ). Figure 7 shows to what European regions are specialised in the Phytopharmaceutical industry. It illustrates that the Danube Region seems to be comparable strong in this regard. Many Danube regions reveal LQ values over 1, which means they are more specialised than others.

Figure 7: Leading European regions in Phytopharmaceutical industry (Specialisation, 2014)

Furthermore, 16 out of 20 Danube regions belong to the top 20 specialised regions among Europe with LQ value of 2.0 or above (Table 6). Some of the regions, like the former Yugoslav Republic of

Macedonia, Kosovo or Zahodna Slovenija appear in any of the top ranking lists in this report for the first time.

Table 6: Top European regions with highest level of Specialisation in the Phytopharmaceutical sector (Location Quotient, 2014)

NUTS	Region	Enterprises	NUTS	Region	Enterprises
FI20	Åland	5.81	LV00	Latvija	2.31
CZ01	Praha	4.86	PT18	Alentejo	2.18
IE02	Southern and Eastern Ireland	2.67	EL41	Voreio Aigaio	2.15
CZ06	Jihovýchod	2.63	CZ03	Jihozapad	2.14
MK00	The former Yugoslav Republic of Macedonia	2.52	CZ04	Severozapad	2.04
RO32	Bucuresti - Ilfov	2.41	RO21	Nord-Est	2.04
RS11	Belgrade	2.41	RO31	Sud - Muntenia	2.00
CZ08	Moravskoslezsko	2.39	SI04	Zahodna Slovenija	2.00
CZ02	Stredni Cechy	2.38	RO41	Sud-Vest Oltenia	2.00
EL30	Attiki	2.37	DE11	Stuttgart	2.00
KV00	Kosovo	2.32			

SUMMARY

The previous results have shown that the Danube Region has developed to become a hot spot in the field of Phytopharma. Besides European frontrunner regions, like Praha region, many others show strong indicators in terms employment, number of enterprises, fast growing firms (Gazelles), or terms of regional specialisation. 50 % of all European regions with two or more Cluster Stars are located in the Danube Region. 44 % of all European workers in the Phytopharmaceutical industry are employed by enterprises coming from this region. All these figures provide good evidence

for the economic strength of the Danube Region. Table 7 (s. Appendix) provides more information about the strongest regions in this sector. Despite of the significant industrial agglomerations in the Phytopharmaceutical sector in the Danube Region shown by this report, only a small number of cluster initiatives exist. They can be characterised to be comparable small in terms of size and young in terms of cluster management experience. In Appendix II the most relevant cluster initiatives are listed.

THE DANUBIOVALNET PROJECT

The DanuBioValNet project is aiming at establishing bio-based industry networks across the Danube Region. The emerging transnational cooperation of clusters will foster bioeconomy and eco-innovations and lead to a strengthening of the regional economies.

Consequently, with this project the partners pursue a strong strategic orientation beyond the immediate and medium-term economic objective of strengthening the regional economy. It is the strategic goal to establish cross-border strategic partnerships, particularly in developing regions, with the help of powerful cluster organisations. In this way, project results will be sustained beyond an immediate effect and the creation of strategic

investments, especially in emerging industries such as the bio industry, will be enabled and facilitated. This will be achieved mainly by newly emerging or transforming value-added chains, which are increasingly being transnationally established and further developed as a result of the increasing internationalisation of value-added processes. In this way, long-term economic effects are achieved, based on a network of agile clusters, which prepare the investment approaches in a targeted manner and implement them with high efficiency. One example of the present project is the establishment of bio-refineries in the regions, which can form a strategic technological backbone of a successful independent bio-industry.

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. With the project, a pilot function of the implementation is taken over and the prerequisite for creating a blueprint for similar and similar cross-national cooperation, also in other industries, is created.

For achieving these tasks, 17 project partners from 10 countries have joined forces. The project will pave the way from an economy based on fossil resources towards an economy using renewable resources. The striving of the partners to minimise greenhouse gases and resource-saving as well as resource-efficient utilisation of available biomass will result in synergistic effects. These effects will improve the sustainability, regional development through diversification of the local economy and will also positively affect the workforce.

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. But due to a missing holistic transnational approach, Danube actors in bio-based industry still operate disconnected and cannot properly benefit from the potential. Therefore, the aim of this project is to develop new methods, strategies and tools to connect enterprises transnationally.

Clusters as the strong representatives of a group of industries that are closely linked by common

products, markets, technologies and interests are chosen to organise and bear the industry cooperation and creation of new value chains, because they are performant and sustainable partners and guarantee the upgradeability in the dimension industry, sciences and also politics.

One of the planned outputs of this project will be the development of a Joint Bio-based Industry Cluster Policy Strategy (JBCS) to describe the procedure and to make it actionable and reusable. Furthermore, a bundle of new methods and tools to support clusters for transnational working will be developed and joint into a strategy. They will be tested in three pilot actions where it is planned to create new bio-based value chains in the Danube Region.

The main target groups are on the one hand the policy – four Ministries are involved –, on the other hand clusters and their SMEs – nine cluster organisations are involved. The policy level will benefit from the JBCS, which can be used as a political framework.

The clusters and SMEs will benefit from the new innovative tools and methods developed for transnational cross-clustering. Successfully established new bio-based value chains in the pilot actions can motivate other clusters and SMEs to test this newly developed approach in the future.

The following partners commit to the implementation of the cluster partnership and transnational cooperation:

Role	Official Name in English	Acronym	Country
LP	BIOPRO Baden-Württemberg GmbH	BIOPRO	Germany
ERDF PP1	ClusterAgentur Baden-Württemberg	CA BW	Germany
ERDF PP2	Anteja ECG	ANT	Slovenia
ERDF PP3	PROUNION	PU	Slovakia
ERDF PP4	Romanian Cluster Association	CLUSTERO	Romania
ERDF PP5	Association of Business Clusters	ABC	Bulgaria
ERDF PP6	National Cluster Association – CZ	NCA	Czech Republic
ERDF PP7	Business Upper Austria – OÖ Wirtschaftsagentur GmbH - Upper Austrian Food Cluster	UAFC	Austria
ERDF PP8	Ministry of Economy	ME	Romania
ERDF PP9	Ministry of Economy, Entrepreneurship and Crafts	MEC	Croatia
ERDF PP10	Ministry of Education, Science and Sport	MIZS	Slovenia
ERDF PP11	Croatian Wood Cluster	CWC	Croatia
ERDF PP12	Institute for Economic Forecasting	IPE	Romania
ERDF PP13	Business Upper Austria – OÖ Wirtschaftsagentur GmbH – Cleantech-Cluster	BizUp	Austria
IPA PPI	Innovation Center of Faculty of Mechanical Engineering	ICME	Serbia
ASP1	Montenegro Vine Cluster	MVC	Montenegro
ASP2	Ministry of Economic Affairs, Labour and Housing Baden-Württemberg	WM	Germany

LP = Lead Partner, PP = Project Partner, IPA = Instrument for Pre-Accession, ASP = Associated Strategic Partner, ERDF = European Regional Development Fund

APPENDIX I

European top regions in Phytopharmaceutical Industry (Cluster Stars, 2014)

NUTS	Region	Cluster Stars	Firms	Employment (FTE)	LQ	Avg. Wage	Gazelles	Gazelle FTE
CZ01	Praha	3	49,256	110,710	4.86	12,811	136	6,723
CZ06	Jihovýchod	3	32,258	47,198	2.63	12,810	40	1,187
CZ08	Moravskoslezsko	3	18,030	29,042	2.39	12,123	15	402
ITC4	Lombardia	3	3,939	71,923	0.82	48,634	18	466
BA00	Bosnia and Herzegovina	2	5,563	44,162	1.70	6,308	17	384
BE31	Brabant Wallon	2	1,909	4,834	1.77	84,970	5	57
BG33	Severozitochen	2	9,713	18,918	1.85	6,487	19	682
BG34	Yugoiztochen	2	9,941	16,956	1.54	4,600	13	151
BG41	Yugozapaden	2	19,618	47,326	1.48	15,753	37	642
BG42	Yuzhen tsentralen	2	13,686	22,190	1.53	6,878	10	263
CH06	Zentralschweiz	2	1,867	14,125	1.20	55,067	4	74
CZ02	Stredni Cechy	2	19,935	28,943	2.38	12,866	13	221
CZ03	Jihozapad	2	21,499	27,316	2.14	11,899	13	267
CZ05	Severovýchod	2	26,727	30,099	1.96	11,613	14	127
DE11	Stuttgart	2	3,051	93,632	1.98	9,279	4	59
DE21	Oberbayern	2	5,525	48,456	0.97	47,251	9	51
DE22	Niederbayern	2	930	4,451	0.36	49,597	7	628
DE71	Darmstadt	2	4,535	45,107	1.10	65,470	10	233
DE73	Kassel	2	1,214	19,487	1.54	37,777	6	156
DEA1	Düsseldorf	2	4,018	41,980	0.81	58,574	18	482
DEA2	Köln	2	3,063	28,693	0.70	46,579	12	363
DK01	Hovedstaden	2	4,296	26,624	1.35	55,440	8	153
EL30	Attiki	2	2,448	91,794	2.37	20,116	18	7,442
ES30	Madrid	2	18,290	69,844	0.89	48,820	59	1,529
FI1D	Northern and Eastern Finland	2	8,354	24,529	1.83	17,935	4	178
FI20	Åland	2	312	6,502	5.81	6,940	1	8
FR10	Île de France	2	26,959	105,476	0.73	45,880	75	1,252
FR30	Nord - Pas-de-Calais	2	5,746	24,430	0.87	44,695	24	1,511
FR51	Pays de la Loire	2	5,430	39,506	1.35	37,012	25	591
FR52	Bretagne	2	4,808	27,793	1.17	44,174	17	2,033
FR71	Rhône-Alpes	2	13,351	47,381	0.90	45,242	53	808
FR83	Corse	2	1,058	4,328	1.64	29,318	0	0
HU32	Eszak-Alfold	2	4,458	18,278	1.87	15,650	18	235
IE02	Southern and Eastern	2	4,931	113,067	2.67	33,779	9	367
ITC1	Piemonte	2	1,680	14,249	0.45	46,132	3	56
ITH1	Bolzano	2	134	1,179	0.20	45,260	0	0

NUTS	Region	Cluster Stars	Firms	Employment (FTE)	LQ	Avg. Wage	Gazelles	Gazelle FTE
LT00	Lietuva	2	4,750	55,627	1.63	14,246	18	9,985
LV00	Latvija	2	15,269	59,403	2.31	7,113	51	2,145
NO06	Trøndelag	2	467	8,771	1.83	36,235	1	7
PL21	Malopolskie	2	7,231	52,318	1.75	11,866	5	113
PL41	Wielkopolskie	2	8,320	56,149	1.76	14,318	21	658
RO11	Nord-Vest	2	12,561	37,034	1.55	7,865	24	486
RO12	Centru	2	12,054	40,757	1.78	9,821	31	492
RO21	Nord-Est	2	18,487	48,738	2.04	6,164	34	533
RO22	Sud-Est	2	15,996	36,774	1.76	6,990	35	674
RO31	Sud - Muntenia	2	16,845	44,971	2.00	7,538	34	525
RO32	Bucuresti - Ilfov	2	17,602	79,012	2.41	17,135	36	704
RO41	Sud-Vest Oltenia	2	9,628	28,028	1.99	6,473	24	458
RO42	Vest	2	9,572	31,424	1.61	9,068	35	428
RS11	Belgrade	2	3,922	50,611	2.41	12,424	24	519
SI04	Zahodna Slovenija	2	4,382	16,997	2.00	35,880	25	401
UKE1	E Riding and N Lincs	2	604	17,069	1.69	25,292	1	1

APPENDIX II

Selected cluster Initiative in the Phytopharmaceutical Sector

Name	Country	Number of cluster actors	Established
Bulgarian National Association Essential oils, Perfumery and cosmetics (bnaeopc)	Bulgaria	27	1999
Hrvatski Klaster	Croatia	N. A.	N. A.
Orlicko Agrocultural Cluster	Czech Republic	15	2016
CzechBio	Czech Republic	31	2009
IND-AGRO-POL	Romania	10	
HERBAL PHARMANET	Serbia	16	2012
Bioeconomy Cluster	Slovakia	16	2015
Hemp Cluster	Slovakia	25	2015

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