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Bio economy and entrepreneurial ecosystem patterns Case study for Romania - USH Pro Business Lecturer dr. Costin Lianu[footnoteRef:1] [1: **3 E-MAIL ADDRESS: clianu@gmail.com**]

General Manager USH Pro Business Abstract. This paper is investigating various patterns of entrepreneurial relations and engagements that may help the shift to bio economy and the ways they can facilitate entrepreneurial understanding and access to markets and business opportunities in this field. It also investigate the role of universities and cluster in transfer of knowledge towards

bio economy and possibilities of interaction making a case study on USH Pro Business in Romania. Main conclusion of the paper is that participation of entrepreneurs, especially SME but also large companies in active Entrepreneurial Ecosystems (EE) plays an essential role in transposing bio economy from strategy to action but some regions may be well advanced and other lagging behind. High trust and large EE in terms of networking are better fit to accelerate the knowledge and innovation process and universities may play a major role in this direction, as important catalyst.

Keywords: bio economy, entrepreneurial ecosystems, universities, knowledge transfer, clusters, smart specialization, communities of practice JEL Codes: A1 Introduction Bio economic paradigm defines a shift in the way economic activities are conducted in order to meet sustainability goals in terms of production, transportation and commercialization. In spite of the fact that national, supra-national, macro-regional or regional strategies are setting goals for new value chains, new markets and smart specialization in several sectors of bio economy, at the entrepreneurial level there are certain knowledge and understanding barriers related to this evolution. Many managers and organizations are unable to understand and tap the market opportunities and, therefore they lack entrepreneurial engagement into the new bio economy emerging markets. Based on the assumption that bio economy shift has to be done in the new emerging markets, as an entrepreneurial experience, it has to be developed as a part of entrepreneurship engagement.

Bio economy and its sectors Bio economy have been categorized in many sectors and the role of regional specialization has been highlighted. Many comparisons has been made in different regions in order to better understand synergies and interactions of the various elements involved in the formation of bioregions, generic term indicating capacity building of some advanced region in terms of adherence to this new paradigm. According to BERST research project (<http://www3.lei.wur.nl/BerstPublications>) there are eight important sectors such as: biomass, food and feed, construction, chemicals and polymers, pulp and paper, textile and clothing, energy, R&D services. Since it implies various sector economy is considered as well a meta sector worth 2 trillion euro in Europe, creating 22 million jobs, representing 9% of the overall workforce, according to the data released by the European Union. Companies with an interest in bio economy may include agriculture and food industry, green chemistry and industrial biotechnologies, construction, textiles and many others.

Other studies are mapping worldwide the bio region. In Europe studies like EU-ERRIN (<http://errin.eu/content/boosting-economic-growth-and-facilitating-investments-through-bioeconomy-how-build-effective>) are indicating that out of 40 active regions analyzed only few regions have a specific strategy for bio economy. Most of the regions have strategies on different sectors of bio economy (eg on energy, food, waste, bio mass).

There is a large amount of evidence that regions worldwide are indicating bio economy a top priority. It is also largely accepted that bio economy is related to smart specialization processes. In other words bio economy is a high narrated subject and most of statements indicate that the meta sector is important and prevalent in regional strategies. On the other hand, creating a bio economy industrial base implies integrating value chains of different sectors. An horizontal approach of cross specialization among all the sectors is required but still that approach is subject to debates and only at the beginning. The case for entrepreneurial discovery of smart specialization in bio economy is therefore an important issue to be analyzed and understood as well as how smart specialization may be effective based on horizontal approach for a process considered to be rather vertical.

Smart specialization and entrepreneurship ecosystems It is generally recognized that smart specialization healthy trends are not related to a planning doctrine or method but rather a community of good practice of several entrepreneurial discoveries, targeting market opportunities. (Lianu 2015), While specialization is rather vertical, always looking to the value chain of a products or services, multi-sector bio economy industrial base has to be more cross sector niche related which has to deal with horizontal understanding of multi sectors in bio economy. Having this complex dimensions entrepreneurs may find difficult to get specialized smartly in bio economy and identify cross sector niches in the field.

Among different perspectives of entrepreneurship (Borzillo, Straub, Voicu Dorobantu 2016) risk taking visionary entrepreneurs in creating new products and services based on consumer's demand, may be the most interesting from the point of view of bio economy. Indeed entrepreneurs tapping into these new markets should perceive the bio economy new frontiers as 'light houses' of a new economic interactions. Even more, due to the complexity of the value chains which will emerge, requiring interdisciplinary knowledge, building specific regional entrepreneurial ecosystems based on bio economic communities is part of the entrepreneurial challenges. The

member of such ecosystems has to include not only suppliers, producers but a wide range of other stakeholders.

One entrepreneurial ecosystem widely considered to be best fitted for cross sector specializations are clusters. Clusters “are cross-sectoral by their nature, as they refer to a concentration of related industries and institutions, and thus, they can be platforms for innovation and industrial change” (European Cluster Trends, Preliminary Report, European Commission, Brussels 2014, p. 12). Clusters and network of clusters may overcome with necessary knowledge difficulties to develop new products in bio economy. Cross-clustering is based on strategic cooperation of two or more clusters in broad industries like bio economy across different sectors previously mentioned in this paper. Seeking ways to create new value chains may find in clusters and network of clusters the right environment. Clusters and networks can be considered as “springboards” for enabling collaboration among companies and research institutions and universities within the same region, the same country or in different countries (Lämmer-Gamp, Meier zu Köcker, Nerger 2014). Even more, cross-clustering has a geographical dimension being more regional or macro-regional. Most of European clusters cooperate within regions and at national level but, in some cases there is an emerging cooperation at macro-regional level like in the case of EU Strategy for the Danube Region.

Clusters and bio economy Before clusters took off, large enterprises were predominant players of in house innovation processes, from basic research to the marketing of new products. Since value chains become more complex and global, innovation processes has to deal with complex production challenges which requires cooperation of various economic and non-economic actors. The interest in clusters of big companies and multinationals or small entrepreneurs is not merely linked to their business potential but also to the value of knowledge transfer, strategic planning capacity to develop large entrepreneurial ecosystem. Clusters aggregate small and medium enterprises, research centres, universities, large companies or investors which may compete but cooperate in the same time.

One major European cluster based on bio economy is Central Germany’s Bio economy Cluster (<http://www.bioeconomy.de>) situated in Halle (Saxony-Anhalt). Local business and research partners, universities as well, work together in order to use non-food biomasses for energy and new materials production. Wood industry, chemical and petro-chemical sector as well as engineering

co-operate into a regional center for bio economy where the common objective is to expand from testing to industrial production. Fraunhofer Centre for Chemical-Biotechnological Processes CBP in Leuna is developing processes through a combination of chemical and biotechnological methods to allow extraction of basic chemical products from biomass for possible industrial use.

In another example Cluster for Bio technologies (CLIB 2021, <http://www.clib2021.de>), of North Rhine-Westphalia, combines concentration of German excellence in the field of research and develop production and marketing in all sectors of bio economy. Worth to mention that Germany's big manufacturers like Altana, Basf, Henkel, Evonik, Lanxess and Bayer are active in these clusters. In addition, there are over forty SMEs, universities and high-level research centres, associations, banks and venture capital. The clusters also include foreign members. Since 2010 the CLIB has started a coordination programme of scientific projects in the field of biotechnology or the Belgian Bio base Pilot Plan. "The international nature of the clusters appears from the strong international relations that over the years have reached agreements with Brazil, Canada and Malaysia. The cluster is an independent entity, requiring stakes by its members according to their ability-to-pay principle and able to create a turnover" (<http://renewablemater.eu>).

The reason German clusters are a good model of best practice is based on the way Germans manage national strategies. German clusters are part of a strategy ("Bio economy 2030") coordinated by the Federal Ministry of Research and Innovation outlining the national approach resulting in a post-oil economy, thanks to the use of renewable resources and biomasses. It has been created a Federal Bio economy Council, an institution "whose task is to come up with proposals to submit to the central government. Manufacturing and academia have to build strategic alliances along the whole production chain of bio economy in order to receive federal funds (<http://renewablemater.eu>) Other Western countries are following German example. Most representative cluster of the French bio economy is in Picardy. It is the point of cooperation of Industries and Agriculture Resources best known as IAR Pole (<http://www.iar-pole.com>), specialized in green chemistry and industrial biotechnologies with 200 active regional members which work together. Among them one can find Michelin, Roquette, Veolia, L'Oreal, Danone and Lacoste. IAR Centre houses the European Institute of Bio refinery, one of the biggest in the world. Every year it transforms 3 million tons of biomass into sugar, glucose, nutritional alcohol, surgical spirit, ethanol and active ingredients for cosmetics. The French cluster is characterized by the principles of sharing and synergy: the Centre

in Reims also includes a shared R&D lab (ARD), an industrial demonstration plant (Biodemo) and a research centre that links several colleges of further education (CEBB). In Reims a new project is also being developed, Futurol, for the production of second-generation bio fuels that do not use biomass from crops. The French cluster, like in the case of German one, is not limited to regional scale but boasts partnerships with Europe, Canada, USA, Japan, Brazil and India. For many cluster specialists bio refinery international inter clustering is a normal phenomenon. The French bio economy landscape also includes Axelera (<http://www.axelera.org>), a Chemistry and Environment cluster of Lyon & Rhône-Alpes Region specialized in green chemistry and recycling of materials; Agrimip, Agri Sud-Ouest Innovation (<http://www.agrisudouest.com>), a cluster for agriculture and the agricultural and food industry of the Aquitaine and Midi-Pyrénées Regions(<http://www.xylofutur.fr>). In France these clusters together with the IAR Centre created the United Bio economy Clusters (UBC), an association aiming at sharing a national strategic development vision focused on green chemistry and presenting French bio economy in a unified way abroad.

Looking at these best practices, research has been carried on in order to understand critical success factors for bio economy cluster approach. The BERST research project ([www.berst.eu](http://www.berst.eu)) that focuses on benchmarking and smart strategies for building regional bio economies. In BERST, entrepreneurs, policymakers, supportive bodies, and knowledge institutes have been identified the main actors together with a consistent provision of biomass resources and competitive bio economy products.

The relevant main findings of the BERST project are as follows:

- Entrepreneurs, including large-scale industries and small and medium enterprises, and the presence of a certain entrepreneurial culture, play a pivotal role in driving clusters towards successful development of the bio economy in a region.
- Policymakers and supportive bodies who are willing to support the development of the bio economy by providing governance, institutional structures and financial support, are prime movers in a bio economy
- Bio economy R&D institutes and educational organizations provide the technical know-how and innovation without which the development of bio economy products would not be possible.

In Italy as well, a series of clusters devoted to bio economy have been created. The importance of communities of practice dealing with the challenges posed by the development of this meta sector is also clearly emphasized. The creation and development of eight national technological clusters was promoted in 2012 by the Ministry of Education, University and Research with the aim to identify opportunities – clusters organized by companies, universities, private or public research institutions and individuals focused on innovation and active in different national areas – able to act as catalysts of sustainable economic growth both at local and national level. The most important is surely the national green chemistry technological Cluster created by three of the major players in the Italian bio economy: Novamont, Versalis (Gruppo ENI) and Biochemtex (MossiGhisolfi Group), in collaboration with Federchimica, the Italian Federation of Chemical Industry.

Romania: USH Pro Business cluster activity in Bio Economy There is a development gap regarding to clusters in Europe and, in spite of the fact that in less developed Eastern European countries clusters and networks has also emerged, they are only at the beginning of their becoming strong alliances in smart specialization or technological change (Lianu C,2016). There are several causes for this gap from the lack of a proper support from the public authorities and the lack of proper entrepreneurial environment, culture and trust.

In this respect, the paper further investigate the role of universities to fill this gap based on the experience of USH ProBusiness, an university entrepreneurial center ([www.uhsporbusiness.ro](http://www.uhsporbusiness.ro)). As stated, high school may become ideal places for cluster interactions. Attracting clusters and economic concentrations in this field may be the best way to manage innovation in today global competitive environment especially in countries with inconsistent cluster policies. Active economic concentrations cooperating and competing in the same time are based on strategic alliances. We consider that these alliances are build to share and manage knowledge and best qualified to become communities of practice (CoP). A simple model of understanding complex interactions between the players is in that presented figure nr. 1 where the cooperation area may become be named as high potential area for COPs

Figure 1: Business alliances from trust management to high COP potential area Source: author interpretation What we see clearly from all the model of viable economic concentrations is their capacity to cooperate based on trust. Acknowledge and re acknowledged trust is the very essence of economic performances of such alliances. As per our assessment building trust on an agreed area of

cooperation between companies A, B and C is the pre-requisite of forming CoPs with mutual benefits for the partners in research and innovation. Bringing universities inside is beneficial not only for the trust management but also for the innovation processes and developing CoP s as well.

In Romania there few clusters related to bio economy in spite of the fact that the country has considerable potential for bio products. In 2015, USH Pro Business, from its very beginning, put in focus cluster development well as participation of clusters in the EU Strategy for Danube Region (EUSDR). The center assisted formation of clusters and is taking an active role in it is management trying to bring together smart specialization issues in the field of bio-economy with the following cluster partners:

BIODANUBIUS, a cluster dedicated to the bio economy, biodiversity and to the organic production in the Danube Delta. The objective of the cluster is to systematically approach the regional value chain to identify the strategic options to create, intake or retention the value, and starting from the present value chain to develop it using the smart specialization until getting new connected value chains. It is targeting eco-sectors or bio economy specializations, mixing not just the tourism with the bio products but with other unexplored fields such as be the industry of bio mass, new renewable resources, health and treatments, health.

BIOTECH PRAHOVA VALLEY It is an emerging cluster only at the beginning situated north of Bucharest. It Is targeting increase of innovation potential of the enterprises in the following sections:

- Bio Agriculture and Bio Horticulture, Bio Medical, Bio Technology · Bio Economy · Balneo, medical, cultural and trip tourism;

- Nutrients, cosmetics · Environmental protection and conservation · Renewable energy · Cultural and creative sectors

CERMAND (Black Sea and Danube Renewable Energy Cluster - BLESDREC) Cermand is a cluster that focuses on the renewable energy, on green energy and energetic efficiency in the southern region of Romania (Oltenia, Muntenia, Dobrogea), in the Danube, Black Sea and EUSDR macro-region.



The cluster aims to promote the micro generation of energy at regional level with national and European impact. In the same time, using it's own resources, the cluster makes sure that the transition to the renewable energy is included in the local development projects of the authorities, in order to protect the environment. One important objective is the development of bio economic models of business in order to reduce the CO2 emissions.

**SMART ALLIANCE** Smart Alliance is a IT&C cluster. One major objective of the cluster is to participate from the angle of this sector in bio economy.

**ROMANIAN TEXTILE CONCEPT** Romanian Textile Concept is a textile industry cluster. One major objective of the cluster is to participate from the angle of this sector in bio economy for a sustainable development of the textile industry.

**CONSTRUCT CLUSTER OLTENIA** Construct Cluster Oltenia operates in the construction industry and related sectors: design, innovation, research, training and development, production and logistics of building materials. One main objectives is also bio economy.

In order to enhance awareness for bio economy, several cross cluster meetings has been organized by USH Pro Business. Their aim was to try to create CoPs able to further cooperate to shape out future value chains in bio economy based on existing knowledge and business experiences and on the transfer of knowledge from one business group to another,. Researcher, academic professors and students as well were part of this knowledge transfer.

According to studies carried out by our experts connection of economic agents with the research activity or with the professional training or the academic environment were sporadic or insignificant until the formation of the cluster and their internationalization activity was concentrated on the export mainly of raw materials or primary products processed without complex marketing activities and research or trading on foreign markets under own brand (Andrei M, Lianu C, Gudei C, 2016). Main result of the research shows also:

- The companies in the cluster are still insufficiently familiar with the concept of cluster and still at the beginning of the road regarding the establishment of strategic alliances in business or the development of forms of collaboration on the local value chain.

- In an early development stage, well managed, the cluster can capture value on the local value chain through bio processing and through the development of new connections with other local value chains of the bio-economy (eco-tourism, reed, bulrush and other local resources capitalization, waste capitalization, etc.).
- In order to function in the new paradigm of bio-economy it is particularly necessary a constant managerial effort to bring together the members in order to understand and realize the importance of the cluster.
- Using and applying the methodology of the communities of practice to the regional value chain analyses, clusters in wetlands may identify best strategic option for the sustainable development of those regions based on bio economy principles.

Conclusions Interaction of broad group of stakeholders in well-structured ecosystems and public support are critical issues in bio economy sector in order to enhance understanding and knowledge transfer. Therefore, it is important to consider participatory stakeholder dialogue methodology base on long term communities of practice that can facilitate deliberative practices. There are several strategic initiatives in the bio economy but most of them with some exceptions are at the beginning or lack consistency.

In Romania, smart specialization among clusters in bio economy is still in an incipient stage and, due to the lack of the support from public policies, universities may play a crucial role in the process.

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