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Relevance of Clustering in Regional Productive Development Applying Bioeconomy Instruments Application Case: Austral Chaco Region

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Abstract: In a world as dynamic as the one we are experiencing now; it is necessary to investigate and reformulate the relationships between production systems and generate more equitable forms of distribution. Cluster networks or leagues have already proven their efficiency in reaching high levels of competitiveness and productivity in certain territorial systems, but given the characteristics of some developing regions, and in particular considering Chaco Austral Region in Argentina, it is important to generate a or model that catalyzes, through current resources, a transition towards change or improvement of the agro-industrial matrix from the point of view of bioeconomy, and therefore also towards a sustainable development of this territory, and necessarily that serves as model to apply in other territories with similar characteristics. For the study of the production units at the territorial, sectoral and business levels from the bioeconomic point of view, this work will consider, as a unit of analysis, a network of Productive Clusters preponderant at the regional level, with the territory as an operating framework. driving force in a center-periphery context, where development strategies are influenced by relations between different territories in an asymmetric hierarchy of power and flow of resources (typical of developing regions).

Key words: bioeconomy, clustering, productivity, regional development

1. Introduction

The aim of this work is to characterize the matrix of productive clusters from the bioeconomy perspective for optimal sustainable development and productivity improvement applied to the Chaco Austral region. It is observed through the analysis of the theoretical framework of this thesis, that there are relevant cases and studies in some developed regions of the world, but regions that are in the process of development are not included in this background. The following strategic industrial sectors are detected as a possible application of the Bioeconomy in the Austral Chaco Region[1][2] (Argentina): Biofuels, Food industry, Production of organic cotton and oilseeds, Beekeeping industry and honey by-products, Rural tourism and ecotourism and biopharmaceutical industries.

For the analysis of the application case, the beekeeping chain (Level 3[3]) of production of Organic and Monte Honey and its by-products is identified. According to data from the Ministry of Territorial Development and Environment of the Province of Chaco[4], Argentina is among the three main producers of honey worldwide, being the second exporter with an annual average of 70,000 tons, while around 6,000 tons

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are consumed in the country. average. The beekeeping chain in Chaco is made up of more than 800 beekeepers registered in the National Registry of Beekeepers (RENAPA), with 1,768 registered apiaries and 71 thousand hives. More than 80% of organic honey production is generated in the El Impenetrable area. In Chaco, approximately 1,200 tons of honey are produced per year, which generates income of more than $200 million. More than 40% of production has organic certification, which has managed to position organic honey from the Chaco bush in the world. This allows it to be exported to the European Union and the United States since 2018 and marketed at a value of 40% more than conventional honey, which translates into a higher quality of life for local producers.

In this process, the inter-institutional work of all the actors involved in the chain stands out, a public-private framework that works for the development of the sector: the Government, from the Ministry of Production, Industry and Employment and the Secretariat of Territorial Development and Environment; INTA[5]; SENASA[6]; ACERCA (Development Cooperation Agency); the Directorate of Bromatology; the certifiers and the Network of Beekeeping Organizations.

The bioeconomy[7] initially defined by Nicholas Georgescu-Roegen is considered a particular way of understanding the economy, forming part of the new ecological, circular, or blue economy; this allows analysing the sustainability of the interactions between the economic subsystems and considers aspects that were not initially considered and incorporating them as new paradigms. Beyond the recurrent concept of "satisfying needs", what are currently considered are what are the needs that are considered real or true and that do not harm or deteriorate the environment and society in their daily lives, collaborating positively with the productive ecosystem of regeneration and responsible use of resources. The bioeconomy is a tool that could break the logic that characterizes the Chaco Austral Region as peripheral and go towards a specialization with greater added value while increasing productivity levels (3 and 4).

1.1 Bioeconomy

The concept of bioeconomy was initially raised by Nicholas Georgescu-Roegen (1975, 1977), to highlight the biological origin of economic processes and from this to highlight the problems posed to humanity by depending on a limited number of resources. usable (for example, availability of land suitable for agriculture) and that are unequally distributed.

According to the latest ECLAC report, it is stated that a bioeconomy is a) an economy based on the consumption and production of goods and services derived from the direct use and sustainable transformation of biological resources, including the biogenic waste generated in the processes of transformation, production and consumption, b) taking advantage of the knowledge of biological processes and principles and c) the technologies applicable to the knowledge and transformation of biological resources and to the emulation of biological processes and principles.

The relevance of the bioeconomy in Latin America and the Caribbean is highlighted, as an alternative for growth with decoupling of emissions, which contributes to productive diversification, especially in the agricultural and agro-industrial sectors. The potential of (agro)biodiversity resources, the ability to produce biomass for various uses, in addition to food, and the availability of agricultural and agro-industrial waste are underlined. Emphasis is placed on the relevance of the approach to, among other things, promote and strengthen capacities and strengthen collaboration in biotechnology and other enabling technologies, promote developments in bioenergy, diversify the economic base of regional economies, increase value addition to primary production, and

[5] Instituto Nacional de Tecnología Agropecuaria, Argentina.
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[7] Available online at: https://www.cepal.org/es/noticias/que-es-la-bioeconomia-cual-es-su-grado-desarrollo-america-latina-caribe

guide actions for mitigation, emission reduction and adaptation to climate change throughout the value chains linked to biological resources and food systems.

The elaboration of policies for the development of the bioeconomy demands the articulation and alignment of institutional, regulatory, and incentive frameworks, in pursuit of a national vision. In terms of policy development, it is important to know: the endowments, characteristics, and location of biological resources; capabilities in research and development and the environment for the deployment and diffusion of innovations and the protection of knowledge; and the potential and development of markets and acceptance by consumers.

The bioeconomy understood as the use of biomass with the assistance of biotechnologies, to produce energy sources, chemical components, materials and other bioproducts, is a growing production model. Encouraged by various international institutions (OECD, European Commission) and implemented through numerous national strategies throughout the world, the bioeconomy is gaining more and more strength; specifically in Latin America, a region that has one of the largest biomass reserves in the world — in addition to being a major producer of biofuels [1].

In 2009 and 2012, the OECD (Organization for Economic Co-operation and Development) and the European Commission published two fundamental texts on the development of the bioeconomy in Europe: "The evolution of the bioeconomy to 2030: designing a political agenda" and "Innovation at the service of sustainable growth: a bioeconomy for Europe". Both writings consolidated the definitions, the sectors, the actors and the scope of the bioeconomy; They also marked the growing importance of the concept of an economy based on the transformation of natural resources through biotechnologies, in public institutions, research laboratories and companies in Europe.

1.2 Regional Productivity

According to Massaro (2017), in his book Clusters and Value Networks: the new paradigm of productivity, the O.C.D.E. defines "Productivity as the quotient of dividing a production by one of the factors of that production. Thus, we speak of the productivity of capital, investments, raw materials, etc. depending on whether production is related to capital, investments, to raw materials, (...). The most widespread notion of productivity is that referred to human work, (...), when we speak of productivity without another qualifier, then it is the productivity of human work that is involved".

Massaro continues, that to apply the term productivity as a management tool we need a "measure of productivity", although this becomes complicated when we try to consider what is produced and all the factors of production that intervene (which are generally difficult to determine and measure in its entirety).

After analysing their relationships, and delving into their definitions, Massaro concludes that the benefit of productivity is not only for companies, which is why, according to more conceptual and less used statements in the literature, he defines productivity as "the driving variable of economic progress", suggesting that the benefits of improvements in productivity reach all of society. Finally, it suggests a positive relationship between productivity and upward social mobility, supporting the idea that territories are more productive and have a higher standard of living.

Starting from the concept of productivity from the human point of view [2] both motivation and job satisfaction depend on meeting the needs of individuals and their congruence with those of the organization. For this reason, the satisfaction of the same generates a more motivated and satisfied individual at work, which will affect the increase in productivity. There is a positive relationship between job satisfaction and organizational commitment. Both are positively related to other organizational outcomes and productivity.

In both the OECD report and the European Commission communication, the bioeconomy revolves around the key concepts of innovation, competitiveness, and growth, based on R&D in new biotechnologies.

Another important fact that demonstrates the exponential importance of the bioeconomy in Europe is the constitution by the European Commission, in 2013, of an observatory of the European bioeconomy.

This observatory has a significant mobilization of resources and focuses on three pillars: Research (investment, innovation), public policies (interaction and participation of stakeholders) and markets (creation of new markets and competitiveness). One of its objectives is the creation of a database on the current use of biotechnologies and the profiles of biorefineries in the European Union, to better understand the impact of the bioeconomy and to anticipate the social changes that it will generate [1].

These political guidelines greatly influenced national scientific research agendas in Europe and led most countries to define specific strategies and policies on the sector.

In this sense, Germany is considered a pioneer in the field, through the creation in 2009 of a National Bioeconomy Council.

As for national strategies, only two countries have one: Brazil and Argentina. Brazil plays a very important role in the bioeconomy in Latin America and in the world through its large-scale production and transformation of biomass into fuels (biodiesel and bioethanol).

In the case of Argentina, although there is no formal strategy on the subject, most of the sectors prioritized in the 2013 national plan for science, technology, and innovation, “Argentina Innovadora 2020”, are clearly located within the bioeconomy, and the Ministry of Science, Technology and Productive Innovation, MINCYT, has been organizing annual symposiums on bioeconomy, to analyze key technologies and policies for the development of the sector. The MINCYT defines the bioeconomy as an economy that uses biomass in an integrated and sustainable way for the processing of food, biofuels, thermal energy, chemical products, and other materials.

The plan’s emphasis is centered on biotechnologies applied to agriculture and food processing, given the country’s strong agricultural sector. To this we must add those red biotechnologies in the health sector (vaccines and biosimilars) also play an important role in the Argentina Innovadora 2020 program [3].

1.3 Clusterization

The productive conglomerates or clusters are concentrations of companies and institutions of a certain field or industrial sector in the same geographic space. This proximity allows its members privileged access, close relationships, better information and other advantages in terms of productivity and innovation that are difficult to take advantage of from a distance (INTI, 2005). According to Michael Porter, an expert in business administration, today's economic map of the world is dominated by productive conglomerates (clusters), that is, critical masses with singular economic success in certain fields, concentrated in one place. On the other hand, these groupings make it possible for each member to benefit as if they had a larger scale or as if they had been formally incorporated with the others without sacrificing their independence and flexibility (INTI, 2005).

Conglomerates encompass several related industries and other entities important to being able to compete. They extend backwards in the production chain, including suppliers of inputs and specialized infrastructure, and forwards, encompassing marketing channels and customers. Typically, the clusters are linked to government institutions and academic and scientific bodies that provide training, education, information, research, and specialized technical support. They represent a new spatial form of intermediate organization between markets where all

companies participate competing independently and fully integrated mega-companies (INTI, 2005).

In the new economy of competition, the productivity achieved using technology acquires more importance to the detriment of the inputs and the fundamental scales in the old model of industrialization by import substitution. This concerns all industries that are no longer considered high-tech or low-tech, but companies that use technology to increase their productivity. In this context, the productive conglomerates, promoted and supported by public policies, constitute a strategy to improve the productivity and competitiveness of the country's local and regional economies (INTI, 2005).

2. Material and Methods

As a methodology to be applied, in general, and in each of the research phases that require it, the use of QUANTITATIVE and QUALITATIVE techniques and methods are combined in a pertinent manner. Of application is the CASE STUDY method when testing the general research hypothesis, supported by adequate statistical techniques for validating surveys and their results, as well as others of a general nature (for example, analysis and synthesis, analogy, among others) and empirical, but considered pertinent to the research objectives. Of application in the proposed research project, it is, in the exploratory case, to know the context of the companies and in the descriptive study it is to investigate and locate these contexts within the region. Documents, laws, opinion polls and surveys with questionnaires and all information that can be collected to deepen the knowledge of the situation are analysed.

The research is carried out following a “non-experimental” design, which, according to Hernández Sampieri, “is to observe phenomena as they occur in their natural context, and then analyse them.”

The proposed research will focus on finding answers to the questions considered in relation to the specific topic of bioeconomy tools applied to the clusters of the Chaco Austral region of Argentina and the effects on productivity in the development of central-central systems. periphery, supported by complementary research techniques. The research responds to its own model where the qualitative dimension will predominate.

Among the variables to consider, we will analyse human capital, links with rapidly expanding markets, activities, and production processes intensive in learning and innovation, degree of intra- and inter-institutional relationship, barriers that limit access to the market, capacities in science, technology, innovation, and information.

The improvement of productivity is the result of the improvement of human relations, derived from the participation of workers, their inclusion in decision-making and problem solving. Therefore, participation increases the influence of the individual in the decisions of the organization, which will help to achieve higher levels of productivity, which, in turn, will serve to reinforce their willingness and ability to participate (promoting a virtuous circle).

There is ample empirical evidence that demonstrates the effects of motivation, satisfaction, organizational commitment, participation, cohesion, assertive conflict management, leadership, climate, and organizational culture on the productivity of organizations.

Finally, we can ensure that the focus of successful organizations is on people, when people are motivated and organized and apply the principles of productivity, quality, ethical behavior and make a balanced use of technology for human progress, productivity seems be insured [2].

From the government sector, the need to change the productive matrix is repeatedly expressed, particularly in developing countries. In general, and almost always as a mere expression of desire that cannot be put into practice. For this reason, it is of particular interest to achieve a productive matrix model that can be applied and reproduced in different systems and environments

in a dynamic way to improve or change the productive development policy that is applied at a given moment.

3. Results and Discussion

The Chaco Austral Region, Argentina, is currently considered an opportunity for bioeconomic development and this is the basis for this doctoral thesis in the process of being prepared, which is why it is considered essential to analyse all possible variables and indicators, in the short and medium term, and to study the application practice of cases of bioeconomic development. As this is a territory with little productive development, based on incomplete primary production and with little incentives for production matrixes, everything remains to be done and this is an opportunity. The value chains still do not have traction and industrial processes are just beginning, as well as the generation of services and basic technologies.

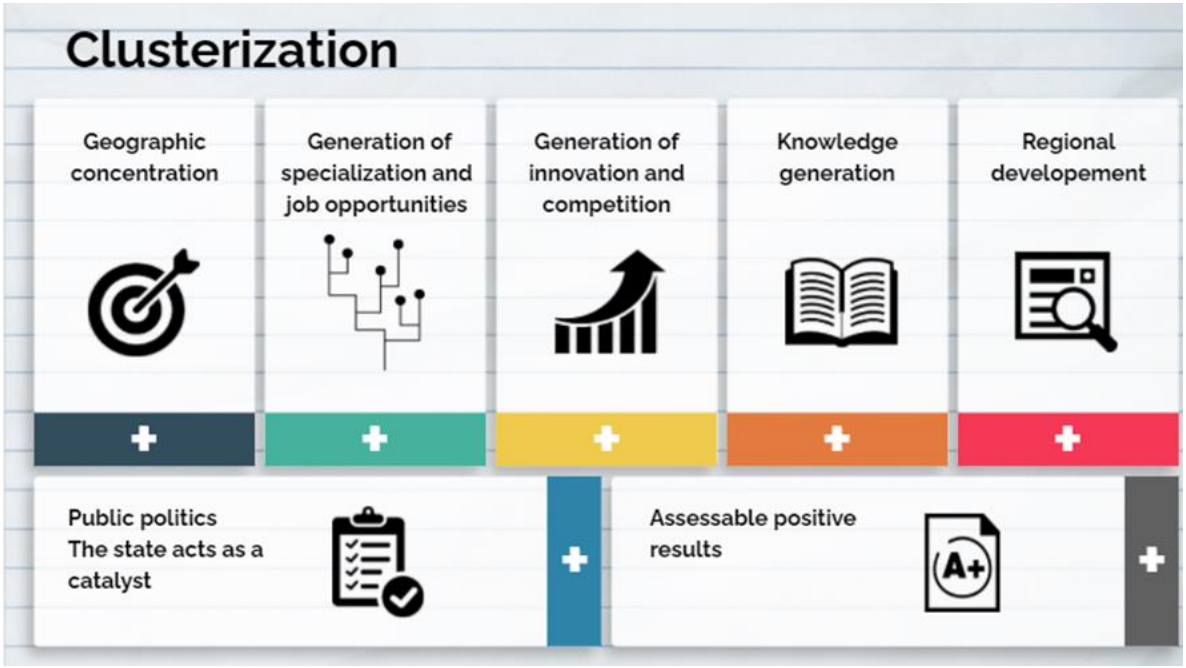

Fig. 1 Characteristics of productive clusters in underdeveloped regions.

4. Conclusion

The Chaco Austral Region, Argentina, is an opportunity for bioeconomic development, which is why it is considered essential to analyze all the possibilities in the short and medium term of practical application of bioeconomic development cases. Being a land of scarce productive development, based on incomplete primary production and with little incentives for production matrixes, everything remains to be done and that is an opportunity. The value chains still do not have traction and industrial processes are just beginning, as well as the generation of basic services and technologies. The work to develop this territory from the bioeconomy is an objective for the coming years.

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