Policies and Business for the Bioeconomy in LAC: An ongoing process

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Abstract:

At the productive level, for more than 30 years, several countries in Latin America and the Caribbean have developed business models related to different bioeconomy pathways. Today some of these countries are leaders in biotechnological applications for agriculture, bioenergies, use of biodiversity and low carbon agriculture. In the political-institutional sphere, the concept of bioeconomy was established in the region through projects assisted by the European cooperation, which promoted the awareness of this topic. In parallel, the countries have elaborated initiatives and regulations for those bioeconomy paths with the greatest potential. Just recently countries started to build policies and strategies specifically dedicated to the bioeconomy. In addition to national efforts, international cooperation has played an important role in promoting regional initiatives for the construction of public goods and the use of good practices and lessons learned. Although important progress has been made in the region, the exploitation of bioeconomy requires greater efforts focused on institution building, policies and market instruments that not only make profitable businesses viable but also ensure a framework of security and sustainability.

Key Words: Latin America and the Caribbean, biotechnology, biofuels, bio-businesses, biodiversity

Políticas y Negocios para la Bioeconomía en ALC: Un proceso en marcha

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Resumen:

A nivel productivo, desde hace más de 30 años diversos países de América Latina y el Caribe gestan modelos de negocios que transitan por diferentes vías de la bioeconomía. Hoy algunos de esos países son líderes en aplicaciones biotecnológicas para la agricultura, bioenergías, aprovechamiento de la biodiversidad y agricultura baja en carbono. En el ámbito político–institucional, el concepto de bioeconomía llegó a la región de la mano de proyectos impulsados por la cooperación europea, que permitieron avanzar en la sensibilización del tema. En paralelo, los países han desarrollado iniciativas y normativas para aquellos senderos de la bioeconomía de mayor potencial. Solo recientemente los países iniciaron la construcción de políticas y estrategias dedicadas específicamente a la bioeconomía. Además de los esfuerzos nacionales, la cooperación internacional ha desempeñado un papel importante en la promoción de iniciativas regionales para la construcción de bienes públicos y el aprovechamiento de buenas prácticas y lecciones aprendidas. Si bien en la región se han logrado avances importantes, el aprovechamiento de la bioeconomía requiere mayores esfuerzos destinados a la construcción de institucionalidad, políticas e instrumentos de mercados que no solo viabilicen negocios rentables, sino que también aseguren un marco de seguridad y sostenibilidad.

Palabras clave: América Latina y el Caribe, biotecnología, biocombustibles, bionegocios, biodiversidad

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1. THE ADVENT OF THE BIOECONOMY IN LAC

In general terms, it could be stated that the implementation of the Bioeconomy began in Latin America and the Caribbean (LAC) in the early 1970s with the launch of the "Pró-álcool" program in Brazil, in response to the price increase in the international oil industry, which spawned the Organization of Petroleum Exporting Countries (OPEC). Later, in the 1990s, this process was bolstered considerably with the developments linked to emerging biotechnologies, especially the creation of capacities and regulatory frameworks, leading to the rapid adoption in some countries - in particular, Argentina - of the first genetically modified (GM) crops and conservationist agriculture practices. Consequently, the region became a world leader in the implementation of these types of production strategies (Trigo *et al.,* 2009a, 2009b).

The idea of the Bioeconomy as a strategy for sustainable development appeared some time later linked to international cooperation initiatives. Different bi-regional projects between the European Union (EU) and LAC fostered debate on the Bioeconomy as the basis of a vision for sustainable development in the region, affecting public bodies responsible for Science, Technology and Innovation (STI) policies. For example, within the framework of the ALCUE-FOOD project (European Commission, 2008) of EU Programme IV, in 2008 a regional workshop was organized in Buenos Aires, Argentina. At this point an institutional commitment was undertaken to carry out a collaborative effort between the LAC countries and the EU interested in the subject, to promote the development of a shared vision of the Bioeconomy, in addition to a particular and differentiating perspective (Trigo & Henry, 2011).

In parallel, the United Nations Industrial Development Organization (UNIDO) proposed, between 2008 and 2009, the formation of a working group on the subject. This group of experts, hailing from more than ten LAC countries and the EU, delivered a report that highlighted the Bioeconomy opportunities for the region and a series of recommendations for action. These included the designing of policies, decision-making, capacity building and the facilitation of business development in the sector (UNIDO, 2009).

In this context of surging interest in the Bioeconomy, the ALCUE-KBBE project "Towards a Latin America and Caribbean Knowledge Based Bio-Economy in partnership with Europe" was approved within the framework of EU Programme VII. Its objective was to establish a cooperative LAC-EU platform to lay down the foundations of a political and institutional environment conducive to the development of the Bioeconomy. This project featured participation by 11 countries (France, Germany, the Netherlands, Belgium, Portugal, Argentina, Colombia, Costa Rica, Brazil, Uruguay, Mexico) and was carried out between 2011 and 2013 (European Commission, 2013). This period can be considered that of the definitive maturation of the idea of the Bioeconomy as a vision for sustainable development, and that of its incorporation into the region's political agenda (Hodson 2014). This was clearly reflected in the implementation of the ALCUE-NET project ("Latin America, Caribbean and European Union Network on Research and Innovation") in 2012-2017, which formally created a Bioeconomy forum within the structure of the bi-regional political dialogues that sought to implement the decisions of the EU-LAC Heads of State Summits (European Commission, 2017).

2. EARLY ADOPTION AND THE PROMINENCE OF BIOECONOMY BUSINESS: A SHOWCASE EFFECT THAT SERVED TO CONVINCE DECISION-MAKERS

In LAC, Bioeconomy businesses appeared much earlier than policies and strategies focused on the subject. In the mid-1990s the region began to use new technologies to make more efficient and sustainable use of biological resources in agriculture and other economic areas. Although at that time different terms were used, the truth is that several LAC countries were early adopters, trailblazers that today they are world leaders in some Bioeconomy businesses, such as the production and export of biofuels, liquids, biotechnological applications in agriculture, carbon neutrality in agricultural chains, and the sustainable use of biodiversity, among several others.

In the case of bioethanol, for example, about 14 Latin American countries have established mandates for the compulsory mixing of ethanol with

conventional fuels, ranging from 5% in Guatemala and Uruguay, to 27% in Brazil (REN21, 2019). In the latter, sugar cane and its by-products account for more than 17% of primary energy and replace 36% of gasoline. Hence, this country stands as the second-leading producer (behind the United States) and the leading exporter of sugar cane ethanol in the world (Stolf & Oliveira, 2020). In the case of the biodiesel industry, Argentina is the world's third largest producer, second consumer and first exporter. The case of Colombia is of special note, as it is the only country in the region that uses palm diesel to comply with the mandatory inclusion of biofuels (10%), and is the leader in the LAC in the production of biodiesel of this type (CEPAL *et al.* 2019).

Meanwhile, in 1996 Argentina became a pioneer in the introduction and adoption of herbicide-tolerant soybeans, before countries such as Australia and India (James, 1997). Today practically all the soy produced in Argentina (as well as corn and cotton) are GM crops (Trigo, 2016). In addition to Argentina, this type of crop has been expanded to Brazil, Paraguay, Uruguay, Bolivia, Mexico, Colombia, Honduras, Chile and Costa Rica, covering more than 82 million hectares (ISAAA, 2018). The benefits of the adoption of GM crops include higher yields and the generation of favourable impacts in terms of environmental sustainability (Brookes & Barfoot 2018). According to the ISAAA (2018), the use of GMOs in the world's agriculture has conserved 183 million hectares of land and averted the use of 671 million kg of pesticides in the last ten years. In 2016 alone it resulted in a massive reduction in C02 emissions: 27 billion kg (equivalent to taking 16 million cars off the road for one year). The region has now developed its own GM crops, such as beans resistant to the Golden Mosaic Virus (Aragão, 2009) and drought-tolerant soybeans and wheat (Waltz, 2015), and it is progressing in the use of new genetic improvement technologies. For example, in Colombia, varieties of rice resistant to bacterial blight, obtained through genetic editing, have been approved (Montaguth, 2020).

In addition, the region has also been a forerunner and today is a leader in Bioeconomy businesses related to low-carbon agriculture and livestock, through efforts like its Nationally Appropriate Mitigation Actions (NAMA) in the rea of livestock, and coffee in Costa Rica (GIZ, 2019); sustainable livestock in

Brazil, Argentina, Uruguay and Colombia (FAO, 2019); as well as in undertakings based on the sustainable productive-commercial use of biodiversity and ecosystem services; and the recovery and exploitation of waste in agricultural chains, among many others.

In all the above cases Bioeconomy businesses have been forces driving the competitiveness of agriculture, environmental sustainability, and the generation of jobs and income in rural territories. Thanks to this, the issue has begun to gain prominence on the public agenda, and many decisionmakers in the region are now convinced of its potential and the need and opportunity to develop Bioeconomy policies, strategies and initiatives. In this way, not only will business be boosted, but this will also ensure that this occurs in a framework of security and sustainability.

3. POLITICAL COMMITMENTS TO THE INSTITUTIONALIZATION OF THE BIOECONOMY AS A DEVELOPMENT STRATEGY: FROM SPECIFIC INITIATIVES TO STRATEGIES TARGETING THE BIOECONOMY

The experiences of countries in other regions around the world demonstrate that political and institutional dimensions are decisive in the transition towards a bioeconomic model, since leadership, governance and coordination between institutions are essential to promote the developments required (Henry *et al.* 2014). Despite the foregoing, in LAC the institutional framework and public policy instruments related to the promotion of the Bioeconomy are lagging behind compared to progress in bio-businesses. It has not been until recently that decisionmakers have recognized the potential of the Bioeconomy, and that countries have established institutions and policies aimed at promoting it.

Each LAC country has established its own political-institutional Bioeconomy agenda, based on availability and access to biological resources, technological capabilities, production/trade structure, and national development objectives. Annex 1 summarizes the development of institutional frameworks and policies regarding different aspects of the Bioeconomy in the region. The sectors of greatest interest have been the regulatory frameworks for

the use and exploitation of agro-biotechnology, regulations on biofuels, the management of biodiversity, and support for national STI systems.

With regard to national STI systems, although the vast majority of countries have national strategies and plans, and sector programs, the truth is that the financial limitations suffered by the region have meant that public investment in research and development is both lacking and highly concentrated in a few countries, focused on solving problems in traditional areas (crops and livestock) (IFPRI, 2020). As an example, while high-income countries invest around USD 2.81 in research and development for every USD 100 of agricultural production, in LAC only Uruguay, Brazil, Chile and Argentina surpass USD 1.

As regards policies associated with the Bioeconomy in the agro-industrial sectors, there are two cases: biofuels and agrobiotechnology. Public instruments have materialized favouring the production of the former, such as tax benefits, and the establishment of free trade zones (FAO, 2013), due to union associativity and the sector's technical capacity. In Brazil, for example, the development of the country's entire Bioeconomy stemmed from its National Alcohol (Pro-Alcohol) Programme, and the rest of the institutional framework developed to promote the use of ethanol and biodiesel as fuels (RenovaBio and CBIO). This trend then spilled over into technological developments in agriculture, chemicals, and medicine, among other areas. In the case of Argentina, since the 1990s there have been value-adding incentives, today materialized in the Scheme for the Regulation and Promotion of the Sustainable Production and Use of Biofuels, set down in Laws 26.093 and 26.334 of 2006 (CEPAL *et al.* 2019). Similar examples can be found in Colombia and Paraguay, where there are laws and guidelines to promote the sustainable production of biofuels.

In the case of agrobiotechnology, 10 LAC countries have national biosafety frameworks that regulate its use. One of the pioneers was Argentina, which in 1991 constituted the National Biosafety Commission (CONABIA), which made possible the early exploitation of these technologies for productive development (CEPAL *et al.* 2019). Over the years, in addition to Argentina,

countries such as Brazil, Chile, Colombia, Paraguay, Uruguay and Honduras, among others, have managed to consolidate the institutional frameworks and policies for the generation and safe and sustainable use of biotechnologies in agriculture. Now, with new genetic improvement techniques, regulation is expected to promote the creation and bolstering of biotechnology-based companies that generate the region's own varieties.

As regards the sustainable exploitation of biodiversity for new businesses, it is essential to know biological diversity thoroughly, and to conserve it (Hodson *et al.* 2019). This is why all the LAC countries have established at least one policy, plan or programme related to the conservation of biodiversity. However, there are still great challenges in terms of bioprospecting and regulations associated with access to genetic resources, intellectual property and benefits for the bio-businesses that take advantage of this natural wealth.

In addition to advances in national plans on STI and regulations governing bioenergy, biotechnology, and the use of biodiversity, some countries have made inroads in the development of policies exclusively addressing the Bioeconomy, with a view to promoting it as a strategy to achieve the sustainable development objectives of the different countries, territories and chains. These approaches seek to build an institutional framework that reflects the transversal nature of the issue.

In this regard, the efforts of Argentina, Costa Rica, Colombia and Uruguay are of special note:

- Argentina: it was one of the first LAC countries to formally work on the creation of an institutional roadmap for the development of its Bioeconomy, through the signing of inter-ministerial agreements and the institution of a National Bioeconomy Council, under the Ministry of Science, Technology and Innovation (Rodríguez, 2018); and the establishment of a National Bioeconomy Programme as a specific mechanism to coordinate MINAGRO's activities on the subject. In addition, in conjunction with the Buenos Aires Cereal Exchange, the Bioeconomy Group was established as an instrument for the identification and promotion of investments in areas related to the

Bioeconomy (CEPAL *et al.* 2019).

- Costa Rica: in 2020 it became the first country in the region to formalize a national Bioeconomy strategy, which aims to further the country's objectives in terms of decarbonization and the sustainable promotion of competitiveness through an economy based on knowledge and the fair and equitable use of biodiversity. The strategy features five strategic axes: 1) Bioeconomy for rural development; 2) Bioeconomy and development; 3) residual biomass biorefineries; 4) advanced Bioeconomy; and 5) urban Bioeconomy and green cities. This process, which was spearheaded by the Ministry of Science, Technology and Telecommunications, will be implemented in three phases: take-off (2020-2022), escalation (2022-2026) and consolidation (2026-2030) (MICITT, 2020).
- Colombia: in December 2020 the Ministry of Science, Technology and Innovation launched the Bioeconomy Mission, a plan laying out and proposing a national strategy dedicated to the development of the Bioeconomy. This mission has five areas and strategic challenges: 1) Biodiversity and its ecosystem services; 2) Biosmart Colombia; 3) Agri-productive and Sustainable; 4) Biomass and green chemistry and 5) Health and Well-being. The strategy's goals include the Bioeconomy accounting for 10% of GDP and generating 2.5 million jobs by 2030 (MINCIENCIAS, 2020).
- Uruguay: engaged in designing a national sustainable Bioeconomy strategy. The process is being overseen by the Planning and Budget Office (which reports directly to the Presidency of the Republic) (FAO, 2018).

Finally, despite the progress in public initiatives in the region, there is still work to be done on institutional support for the creation of financing instruments, long-term action plans, and measurement systems including adequate indicators for monitoring, follow-up and evaluation. Likewise, the coordination of public sector actions must have a comprehensive vision of the different dimensions of public policies, in addition to fostering efforts by the

private sector to generate employment and sustainable production (Trigo *et al.* 2019).

4. EFFORTS TO PROMOTE COOPERATION BETWEEN THE REGION AND WITH THE REST OF THE WORLD

In addition to the efforts made by the private and public sectors in the last half of the decade, various international organizations have promoted cooperation between countries and the exchanging of good practices, lessons learned, and successful experiences in the region. In the same way, they have promoted joint efforts on research and investment projects. One of the first regional organizations to tackle the issue was the Economic Commission for Latin America and the Caribbean (ECLAC), which continued to work through networks and alliances in the countries after the completion of the LAC-EU projects.

Convinced of the topic's potential, in 2018 the Inter-American Institute for Cooperation on Agriculture (IICA) included in its Medium-Term Plan for 2018-2022 the establishment of a Hemispheric Program for the Bioeconomy and Productive Development, which works in the LAC countries towards the: 1) generation of evidence, enhanced awareness and capacity building regarding new uses of the Bioeconomy among agro-rural sector decision-makers and actors; 2) the formulation and implementation of tools and guides for the construction of differentiated roadmaps for Bioeconomy use, depending on the potential of the different territories and value chains; 3) the devising of policies, strategies, regulations and market instruments that showcase and make possible new productive uses of the Bioeconomy in agriculture and rural areas; and 4) the designing and implementation of strategies, plans, programmes, projects and investments to promote new biomass business models in rural territories and agricultural value chains (IICA, 2019b).

In addition, together with the IICA's efforts in the different countries and with its various partners and allies, the programme has made strides to bolster the positioning of the Bioeconomy in LAC's main technical and political forums, the region, and international conferences discussing the Bioeconomy.

Specifically, in October 2019, the Bioeconomy was a central topic at the ministerial meeting on Agriculture in the Americas, and was the subject of a ministerial declaration (IICA, 2019b). In October 2020, the Institute hosted the 24th International Conference on Applied Bioeconomy (ICABR), which was to be held in Latin America (Argentina) for the first time. However, due to the COVID-19 pandemic it was shifted to a virtual format (IICA 2020b). In November 2020 LAC played an unprecedented role at the *Global Bioeconomy Summit,* of which IICA was one of the five official partners (GBS, 2020).

In addition to IICA and ECLAC, other international and regional organizations, such as the International Labor Organization (ILO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Inter-American Development Bank (IDB), and the US Food and Agriculture Organization (FAO), have supported initiatives aimed at fostering regional cooperation in the areas of policy, indicators, technology and capacity building, among others. As a result of these interests, and prompted by an invitation extended by the Argentine government, in 2018 the Latin American Bioeconomy Forum was held in Buenos Aires. There, a Latin America Bioeconomy Network was established, which aims to promote a regional development strategy fostering exchanges of experiences and collaborative projects (MINCyT, 2019).

5. NOTES ON THE PENDING AGENDA

LAC has a competitive advantage when it comes to making the Bioeconomy an engine driving post-COVID-19 socioeconomic reactivation and a strategic asset for successful insertion into the new environment, given that it is home to 8 of the 17 most megadiverse countries on the planet, and more than 25% of its arable land; and it boasts 33.3% of the world's freshwater resources, which makes it the region with the greatest potential for biomass generation (CEPAL *et al.* 2019).

However, for the Bioeconomy to be a viable and profitable development model for the different types of agriculture and rural territories in LAC, and to generate links with other economic sectors, it is essential that scientific-technological developments be combined with normative and political frameworks, as well as market approaches and inclusive mechanisms

that generate incentives so that economic agents along the value chains make the decision to use biological resources and processes more efficiently in their production, transformation and commercialization models.

The main policies favouring the Bioeconomy are the following: a) environmental, sanitary, agricultural and health regulation frameworks that facilitate the promotion of the Bioeconomy; b) instruments to promote the creation or growth of Bioeconomy markets (public purchases, labelling, standards, market regulation and transparency, etc.); c) economic, financial and fiscal stimuli (financing, differentiated taxes, investment funds, support, etc.); d) the generation and/or strengthening of technical-scientific capacities for innovation; e) industrial location policies for the Bioeconomy (the promotion of clusters, training, Direct Foreign Investment (DFI), technology transfer, etc.); f) political support for biologically-based social change (awareness of potentialities); and g) the promotion of Research and Development through innovation programmes, clusters, pilot programmes, the generation of technologies, the strengthening of enablers, etc.).

In addition to the efforts undertaken in the region, to take advantage of the Bioeconomy as a regional development strategy, supranational initiatives - led by developed countries - are required, with a view to: i) a broader agreement on guiding principles for the formulation of global Bioeconomy policies, ii) a credible bioeconomic indicator framework and iii) an effective Bioeconomy knowledge management platform (Chavarría *et al.* 2020).

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