

# Bioeconomy in Argentina in support of the implementation of the agenda 2030

Christoph Ernst, ILO<sup>1</sup> (e-mail: [ernst@ilo.org](mailto:ernst@ilo.org)), Sofia Rojo, ILO consultant<sup>2</sup>

## Abstract

Bioeconomy is an emerging path for productive development. It refers to economic activities that use knowledge and natural resources of biological origin to produce goods, services, or energy. Bioeconomy provides wide opportunities for middle income and emerging economies to innovate, diversify and complexify their economies for higher productivity, economic growth, jobs and decent work. It has the potential to lead to a more sustainable and inclusive development path, promoting in particular SDG8 and SDG9.

Based on the agro-industrial peanut cluster experience, in Argentina, the article shows how the potential of the bioeconomy could be further harnessed and strengthened.

---

Bioeconomy has become a newly emerging path for productive development. Bioeconomy refers to economic activities which use knowledge on genetic, molecular, and genomic processes (e.g., biotechnology) and natural resources of biological origin (biomass) to produce goods, services, or energy. Bioeconomy provides wide opportunities for middle income and emerging economies to innovate, diversify and complexify their economies for higher productivity, economic growth, jobs and decent work. It has the potential to lead to a more sustainable and inclusive development path, promoting in particular SDG8 and SDG9.

Argentina is promoting the bioeconomy as part of its development strategy to upgrade the production system and industrialise, based on four strategic assets: i) a rich biomass offering great opportunities for developing the bioeconomy: Abundance in forest, highly competitive agriculture and livestock chain, vast maritime resources, ii) comparative advantage in science and technology related to the creation of sustainable innovations (e.g. biotechnology), iii) advanced industrial sectors (e.g. chemistry, food production) and iv) an acceptable infrastructure in key areas for bioeconomy. (Rojo, et.al 2021)

The country holds dynamic and collective capabilities which can be applied to R&D, new technologies adoption and innovation in the bioeconomy. Indeed, a relevant set of skills in science and R&D already exists in the labour force and, resulting from past R&D and innovation activities and experience, relevant rules and procedural knowledge underpinning institutions have been developed.

Existing dynamic and collective capabilities to innovate in two main sectors, modern agriculture and biotechnology, have been re-combined thus enabling

the society and the labour force to develop a new activity, bioeconomy, and thus to diversify the economy (Nübler, 2014).

## The agro-industrial peanut cluster experience

The agro-industrial peanut cluster experience shows how the potential of the bioeconomy could be further harnessed and strengthened in Argentina to overcome existing bottlenecks and to promote sustainable development goals.

Argentina is one of the main peanut-products exporters, a key supplier of the EU . The country has a Peanut Agro-Industrial Cluster, where farmers and SMEs are integrated to industry and exports. The Sector accounts for close to 12,000 jobs, direct and indirect, linked to agrochemicals production, farming and industrial equipment and machinery, quality control laboratories, quality assurance and certification services for products and processes, shipping and transportation, agro-industrial technology for peanuts and communications and IT services (APC, n.d).

In the last decade, Argentinean peanut product exports have grown exponentially. As a result of this expansion, large volumes of peanut shell residues were generated, challenging the environmental sustainability of the cluster, and creating opportunities to transform them into bioenergy and bioproducts, such as biofertilizers, sustainable construction materials, dyes, activated carbon, among others.

Indeed, public-private cooperation fostered the development of five thermal power station that generate electricity using peanuts shells as fuel, to self-supply peanut plants and to provide the National Grid (APC, n.d). Several policy instruments of the country's

---

<sup>1</sup> Senior Economist, Lead of the Transition to Formality Team. E-mail : [ernst@ilo.org](mailto:ernst@ilo.org), Ph: +41.22.7996924.

<sup>2</sup> ILO consultant and author of various research and policy articles on bioeconomy, circular economy and green jobs.

innovation system (IS) favoured the process. Indeed, the National Institute of Industrial Technology (INTI) and the National Ministry of Agriculture Project PROBIOMASA contributed with technology transfer, while financial support for the construction of the plants came from the National Ministry of Energy RenovAr Program (National Ministry of energy, n.d). In addition, sustainable innovations allowed to transform ashes into bioproducts, minimizing waste. Ecological bricks for construction (that surpass traditional ones in thermal conductivity, water absorption and acoustic values and have lower prices); and biofertilizers can be mentioned (Added value; n.d.).

With the IS support, more complex bioproducts were developed, such as an activated carbon that substitutes imports in the pharmaceutical and food industries and in water sanitation. The carbon activated project was developed by a public-private partnership (Cotagro Agricultural Cooperative and the Universities of Salta and Río Cuarto) while the National Innovation Agency financed R&D and the carbon plant construction. The system was patented (La Nación; 2007, 06, 02). Another example is the oleophilic blankets that uses peanut shell absorbent properties. These blankets are used to clean up the soil, mainly in the oil industry, they were developed by the R&D consortium Y-Tech and are produced by a subsidiary of the YPF<sup>3</sup> buying peanut shells from the farmers (Diario Río Negro; 2018, 05, 09).

These examples show important progress in circular economy practices. However, there is an untapped potential as not all residues are used yet; and more complex use of these resources could be achieved through biorefineries. A regulatory framework is required to organize and stimulate the development of new bioproducts. Also, the cluster faces investment restrictions due to macroeconomic instability and the lack of long-term financing. These restrictions are more severe for smaller companies. Subsidized energy prices also limit bioenergy development.

In addition to residues, the peanut cluster faces other problems that require sustainable innovations and solution. Currently, a fungus (*Thecaphora frezii*), is threatening crops yields, a problem that biotechnological research seeks to solve. Indeed, a public-private partnership among the National Institute of Agricultural Technology (INTA), universities and a private firm "El Carmen" have developed a seed resistant to the disease (CONICET;2019, 07, 19). However, the problem

requires additional surveillance and biotechnological development efforts.

Achieving Good Agricultural Practices (GAP) with sustainable innovations is another challenge the cluster must overcome. Peanut pods develop underground level requiring harvesting methods that are aggressive to the soil. To ensure sustainability, improved GAP are important, such as crop rotation (no more than 4 years), direct sowing or minimum tillage, and cover crops use, among other (Fernandez & Giayetto comp.; 2017). Provincial agriculture agencies, based on INTA research, define GAP for peanuts and monitor its application on farms. These regulations not only improve agriculture practices but also stimulate the local farm machinery industry to upgrade designs for better sustainability. A high proportion of the equipment used by the peanut cluster is produced locally.

Regarding employment, R&D activities, more sophisticated production processes and controls demand new technical and professional profiles of the labour force in related activities. Several regional universities and agrotechnical schools contribute to a good development of human resources and the availability of the needed profiles. Also, labour policy contributes to improve the quality of jobs and, mainly through the National Work Regularization Plan, in which the farm workers union has an important role, in labour inspection activities (UATRE, Argentine Union of Rural Workers).

It is important to highlight that the peanut cluster has been fostered by national productive policies, mostly horizontal, articulated and adapted to the specific cluster needs, by a local public- private institutional framework. The Argentine Peanut Chamber (APC) and the Argentine Peanut Foundation (APF) are part of the Peanut Scientific and Technological Network. Local institutions' main objective is to improve the cluster competitiveness. As sustainability is an important factor in global competitiveness, efforts to improve the commercial position have a favourable impact on the SDGs, aligning productive, environmental, and social objectives.

---

<sup>3</sup> YPF is the main energy company in Argentina, which not only leads the oil and gas value chain (production, refining

and sale of fuels) but also, since recently, it produces renewable energy.

## Conclusions

The case study shows how bioeconomy contributes to promoting innovation processes and diversification of the economy.

Indeed, it shows that circular bioeconomy practices reduce environmental impacts, transforming residues into resources for bioenergy and bioproducts. Also, bioeconomy may foster GAP, through a better understanding of agricultural practices effects on the environment and how to mitigate them. New GAP standards may stimulate innovation processes in related activities, such as agricultural machinery industry or services for precision agriculture generating indirect effects on productive development. Biotechnology is transforming agriculture, improving seed quality, crop yields and adapting seeds to climate change (water regime and new diseases).

Collective capabilities are the key drivers of the productive transformation. The interaction between IS institutions and producers promote a cumulative process where technological change and transformation of capabilities reinforces each other, creating a virtuous circle of capabilities development and productive transformation.

This process does not occur spontaneously but is the result of an integrated policy strategy and framework that strengthen the educational system, the IS, and develop green industrial policies benefitting the cluster. In particular, at the local level, coordination efforts of the proactive cluster institutions are crucial.

Thus, bioeconomy has the potential to provide jobs to a variety of workers, ranging from unskilled workers in agricultural production, blue collar in processing, and highly skilled workers in labs, R&D and biotechnology activities, with a high participation of female workers (Dragun et.al, 2020).

However, the case study also identifies further bottlenecks which persist and need to be resolved to promote sustained development. Access to long-term financing could enhance production of new and more complex bioproducts, particularly among smaller companies. Also, the removal of fossil fuel subsidies could facilitate bioenergy development.

## Acknowledgments

The authors thank Eduardo Nervi, former president of the Argentine Peanut Chamber and current president of Loren Trade S.A; and Ximena Rojo, Agricultural Engineer; for their contributions.

## References

- Added value (n.d.) *They process peanuts, make energy and now bricks with peanut shell ashes!* Added value. Argentina. Retrieved on March 10, 2023 from <https://www.valoragregadoagro.com/2020/10/06/procesan-mani-hacen-energia-y-ahora-ladrillos-con-cenizas-de-cascara-de-mani/>
- Argentinean Chamber of Peanuts (n.d). *El Clúster del Maní*. Retrieved on March 10, 2023 from <https://camaradelmani.org.ar/cluster-manisero/>
- CONICET (2019, 07, 19) Desarrollan híbridos de maní resistentes al carbón. *Consejo Nacional de Investigaciones Científicas y Técnicas. Argentina*. Retrieved on March 10, 2023 from <https://www.conicet.gov.ar/desarrollan-hibridos-de-mani-resistentes-al-carbon/>
- Dragún, P., Ernst, C., & García, F. (2020). El futuro del trabajo en el mundo de la Industria 4.0. *Buenos Aires, Unión industrial Argentina/Organización Internacional del Trabajo*.
- Fernandez H. y Giayetto O (comp.) (2017) *El cultivo de maní en Córdoba (2° ed.)*. Universidad Nacional de Río Cuarto. Argentina.
- La Nación (2007, 06, 02) Carbón activado con cáscara de maní. *Diario La Nación. Argentina*. Retrieved on March 10, 2023 from <https://www.lanacion.com.ar/economia/campo/carbon-activado-con-cascara-de-mani-nid913623/>
- National Ministry of Energy, (n.d) *Projects awarded from the RenovAr Program. Rounds 1, 1.5 and 2*. Retrieved on March 10, 2023 from <https://www.minem.gob.ar/www/833/25897/proyectos-adjudicados-del-programa-renovar>
- Nübler, I. (2014). A theory of capabilities for productive transformation: Learning to catch up. In Salazar-Xirinachs, Irmgard Nübler and Richard Kozul-Wright (editors), *Transforming economies: Making industrial policy work for growth, jobs and development* International Labour Office. – Geneva: ILO, 2014
- Río Negro (2018, 05, 09) Vaca Muerta: La cáscara de maní abrió el mercado de las mantas oleofílicas. *Diario*

*de Rio Negro, Argentina*. Retrieved on March 10, 2023 from <https://www.rionegro.com.ar/vaca-muerta-la-cascara-de-mani-abrio-el-mercado-de-las-mantas-oleofilicas-HB5663832/>

Rojo, S., Ernst, C., Lengyel, M., Zanazzi, L., & Pizzicannella, M. (2021). *La bioeconomía en Argentina y sus efectos sobre las dimensiones socioeconómicas del desarrollo*. Organización Internacional del Trabajo.