

Table S5. A detailed analysis of the key players in the agricultural and rural sector in Colombia

Aspect to be assessed	Result analysis
1) Programs for training and universities related to agriculture	<p>The regional innovation systems mapping analysis highlights the concentration of institutions and educational programs in environmental issues and agribusiness, especially in Bolívar and Meta, which implies a strategic focus on sustainable development, collaboration with industry, and specialized training, with the presence of several institutions in Tolima. In the analysis of agricultural extension organizations in four departments, Bolívar stands out with 42.20% of the 109 organizations identified due to its size and number of municipalities. In Tolima and Chocó, AGROSAVIA and the Universidad Nacional are leading agricultural and agroindustrial projects, and in Tolima PROTABACO SAS and UNISARC also stand out as executors, with UNISARC focusing on academic areas of rural development and agricultural sciences.</p> <p>In 2020, in Tolima, priority was given to several agricultural and cross-cutting projects, such as value-added coffee, 4.0 technology in livestock, cocoa, and fish agribusiness, as well as initiatives in renewable energy, tertiary roads, competitiveness and innovation, and a technology development center. There is also mention of a dairy agroindustrial facility project in Roncesvalles and Cajamarca.</p> <p>In agricultural and rural development in Tolima, the territorial actors include various components and entities, from the Sectional Council for Agricultural Development to universities, producer associations, and governmental entities such as National Parks, CORTOLIMA, the Governor's Office, and other institutions.</p>
2) Main agricultural extension organizations and implementers of agricultural, agro-industrial, and environmental projects	
3) Departmental Agenda for Competitiveness and Innovation ADCI - Tolima	
4) Maps of territorial stakeholders linked to agricultural and rural development	
5) Relationship of actors in the agricultural R&D subsystem in the departments of Chocó, Meta, Tolima, and Bolívar.	<p>According to the Departmental Competitiveness Index Tolima, Bolívar, Meta and Chocó [43] have low positions in competitiveness and R&D&I, occupying positions 11 and 12 respectively. Given this, it is crucial to promote projects that drive innovation in the agricultural sector, involving key stakeholders according to the UNCTAD framework and Law 1876 [17].</p>
6) Research collaboration: Co-authorships and alliances	<p>The territorial distribution of research indexed in Scopus was analyzed, using co-authorships in 42 scientific articles, with Tolima accounting for 47.61% and Meta for 33.33%, and the collaboration of the Nataima Research Center Agrosavia with several institutions in 5 related publications stands out. with agriculture.</p>
7) Exploration of relationships in agricultural patents registered in Colombia	<p>The Lens Patents database was used to analyze the relationships in Colombian agricultural patents utilizing keyword search equations, obtaining 50 registered patents. Although there were no collaborative patents in the four departments studied, institutional relationships and international collaborations were found in the ownership of agricultural patents in Colombia.</p>
8) Analysis of project profiles registered with the Rural Development Agency [44]-	<p>In the analysis of project profiles registered with the Rural Development Agency during 2020, Tolima leads with 44.44% participation, followed by Meta with 22.22%. The livestock sector is prominent in the profiles (13.46%), followed by coffee and poultry (9.61%). Stakeholders include small producers, indigenous reserves, Afro-descendant families, production chains, and families, showing collaboration in the formulation of the profiles.</p>
9) Projects under implementation and executed financed by various sources	<p>The analysis of projects executed and to be executed with various sources of financing shows that Tolima leads in comparison with Chocó and Bolívar, addressing areas such as planting material, genetic improvement, sanitary management, soil and water management, and geographic information systems, with frequent participation of entities such as AGROSAVIA,</p>

	<p>UNAL, CIB, Universidad del Tolima, UTP, PROTABACO SAS and UNISARC, among others.</p> <p>The analysis of the relationship of entities and territories with the General Royalties System as a source of financing in Agriculture and CTeI reveals that Chocó and Bolívar have the best relationship, with more than 440 thousand and 417 billion Colombian pesos, respectively, while Tolima has the lowest relationship, with 191 billion. Tolima leads the execution of projects financed by the SGR in Agriculture and Rural Development, addressing issues such as rural housing, coffee, livestock, cocoa, sanitary units, and fish farming.</p> <p>Regarding SGR resources for CTeI, the outstanding relationship of the two departments with the SGR's CTeI Fund stands out: Bolivar leads with 29 projects (31.52%) and Tolima follows with 27 projects (29.34%) of the 92 projects financed.</p> <p>The financing resources of the SGR's CTeI Fund for the 4 Departments are observed with Bolivar leading (44.18%) and Chocó (29.63%). In Tolima, projects CTeI are being executed with \$130,268,736,977, focusing on training, the Sheep and Goat Chain, CyTCapacities, and Cocoa, with outstanding participation of the Government, the University of Tolima and Agrosavia in their execution. It is also noted that the SGR's CTeI Fund has helped finance Tolima projects in different agricultural products, such as avocado, and coffee, among others.</p>
10) Optimizing the relationship between financing and government in the General Royalties System	
11) Overview of SGR resources for CTeI	
12) Public investment projects financed with resources from the General Royalties System - SGR (2022)	
13) Analysis of associations, cooperatives, agricultural, and related foundations in the regions.	<p>In the analysis of associations, cooperatives, agricultural foundations, and similar in the region, Meta leads in associativity with 294 entities (39.72% of the total), followed by Tolima with 242 organizations (72.43% of the four territories). In Tolima, associations predominate (92.56%), and there is a greater presence of foundations compared to Meta.</p> <p>The news analysis shows that the relationship between associations and cooperatives has been mainly with state entities such as the Ministries of Agriculture and Rural Development, Governors' Offices, ICBF, and Mayors' Offices, as well as with NGOs and foundations for knowledge transfer, training, productivity improvement, certification. food supply, dissemination of results, and financing.</p> <p>A cluster is a geographic concentration of companies and entities related to similar activities, intending to foster competitive cooperation to improve quality, reduce costs, and increase productivity and profitability. Bolivar, Meta, and Tolima have 2 registered agricultural clusters, while Chocó has none. The initiatives arise from the Regional Commission for Competitiveness and Innovation with the support of the Chambers of Commerce. In the department of Tolima, there is information on a cluster initiative registered for the cocoa agrifood chain and an initiative for the specialty coffee subsector.</p> <p>The Cabildos and reservations are forms of association that legally represent indigenous communities, and the reservations are territorial divisions that guarantee ownership over customary inhabited territories. Of these, 251 were identified in the four Departments, with Chocó standing out with 55.4% and Tolima with 32.6% of the communities grouped.</p> <p>According to the database of the Ministry of Science Technology and Innovation of Colombia, in the call for recognition of research groups (Call 833 of 2018) between 2018 and 2019, 20 groups were identified in the 4 territories analyzed in the area of agriculture and related areas. The department of Meta has the most recognized groups (10), followed by Tolima (8) and Chocó (2), while Bolívar reports no groups in these areas. Groups such as the Agroforestry Livestock Systems Research Group of the University of Tolima and Conservation Agriculture for Low Tropic Soils of Agrosavia Meta show opportunities for collaboration in the science, technology, and innovation system.</p>
14) Analysis of the relationship between associations or cooperatives and other entities	
15) Analysis of cluster initiatives (agricultural and related) in the regions of interest	
16) Cabildos and Indian Reservations	
17) Relationships between research groups and institutions in Colombia - agro and related groups in the regions	
18) Technoparks in the regions and Technology Transfer Offices OTRIS	<p>In the regions analyzed (Chocó, Bolívar, Tolima, and Meta), only one Tecnoparque SENA was found in the Department of Tolima, and no</p>

technology transfer offices or corporations were found in any of the territories. Although some universities have Research Results Transfer Offices (OTRIS), they focus on internal transfer. Despite the lack of OTRIS, the regions can access services from other nearby OTRIS, such as Reddi in Cali, CONNECT in Bogota, OTRI Estratégica de Oriente in Bucaramanga and CIENTECH in Barranquilla.
