

Opportunities and challenges in the Orinoquia region/the territory for consolidating the Colombian Agricultural Innovation System

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The purpose of Law 1876 (29th of December 2017) was stated to be, “The creation and implementation of the Colombian Agricultural Innovation System (CAIS), consisting of subsystems, strategic plans, planning and participation instruments, management platforms, procedures for its implementation and mechanisms for its financing, follow-up and evaluation. This law creates new functions, competences/skills and mechanisms for coordinating pertinent national and territorial entities and organisms forming part of the CAIS and creates the public service for agricultural extension and the regulations for providing it.” The CAIS has the following subsystems: the Colombian Agricultural Research and Technological Development Subsystem (CARTDS), the Colombian Agricultural Extension Subsystem (CAES) and the Colombian Formation and Training for Agricultural Innovation Subsystem (CFTAIS).

The first thing to cross one’s mind when reading the purpose of the law is that it is an unnecessary legislative effort, as it is believed that Colombia does not need to issue a law for creating a system, much less so for ensuring the coordination of the pertinent entities. However, the reality of the situation is very different. Table 1 summarises the functioning of the three subsystems’ created by the law, detailing the current diagnostic situation and the actions proposed for improving them.

Regional diagnosis is telling. The Colombian Ministry of Agriculture and Rural Development’s (MARD) Siembra website reported that only 387 people graduated in programmes related to the agricultural sector in the region’s departments (i.e. Arauca, Casanare, Meta and Vichada) during 2017; 230 of them graduated as technologists, 157 earned a BSc, 9 had taken a specialisation and 5 earned an MSc. The Colombian Agricultural Census’ (CAC) figures would thus mean a ratio of 340 agricultural production units (APU) for every technologist, 498 for every BSc, 8,680 for every person taking a specialisation and 15,624 for every MSc to address the region’s 78,118 APUs. Such situation contrasts with the technical assistance/training figures reported in the CAC which revealed that only 11,930 of the region’s APU (i.e. 15.3%) had received technical assistance. This situation highlights the need for coordinated action for increasing the deployment of the CAFTAIS training subsystem for producing available human resources to deal with the CAES agricultural extension subsystem in a timely and relevant manner.

The CAFTAIS training subsystem’s challenges (apart from those related to curricula, infrastructure and resources) are thus focused on how the system becomes reconstructed regarding new challenges and demands, represented by changes in labour market structure, the progressive introduction of new technologies and their repercussions on production modes and relationships, market globalisation and increasing cultural homogenisation.

The region has only 28 research groups working in agricultural sector-related areas; all of them are located in the Meta department and only 13 of them have been categorised according to Colciencias’ productivity-associated classification (4 in category A, 2 in category B and 7 in category C). This could explain the low disbursement rate from the General Royalties System’s (GRS) Science, Technology and Innovation (STI) Fund due to the need for strengthening the system to improve its formulation, presentation and execution capabilities regarding projects orientated towards resolving the region’s problems through STI-related activities.

Regional and national challenges for the CARTDS technological R&D subsystem are thus expressed in the need to overcome the inadequate and insufficient resources for enhancing human talent, providing basic infrastructure and using appropriate technologies for ensuring the region's development, understanding that scientific and technological backwardness constitutes a common denominator regarding poverty, marginalisation, low quality of life and the loss of opportunities for the population.

It is clear that the Orinoquia region's agricultural sector requires urgent investment in STI to guarantee the differentiation, quality and safety of its most traditional products, such as meat, soybeans, rice, fruit and palm oil, as safety- and quality-related restrictions go beyond the need to protect consumers' health in a globalised world. Other countries' experience has shown that such measures are also used for economically protecting markets as reducing other commercial barriers, such as tariffs, can be used as protectionist mechanisms since their technical complexity and the great scientific uncertainty associated with their use hamper questioning them once in force.

Economic globalisation does provide opportunities for gaining access to new markets, resulting from advances in information flow, technology and capital; however, particularly regarding the agricultural sector, this is accompanied by threats demanding a change of strategies. Nevertheless, a large part of the agricultural sector has not been able to successfully face the new conditions and, faced with such reality, developing STI capabilities has become a fundamental element in the search for greater competitiveness, in some cases representing the only alternative for survival.

The agricultural sector's traditional way of functioning can only survive in this new scenario if it can reconvert itself. There is an evident need today to act with innovative tools and strategies to avoid agricultural products in the Orinoquia region being doomed to the undesirable fate of commoditisation, i.e. being a primary product lacking value different to that of its purely generic nature. In fact, Colombia's Banco de la República has stated in its Draft Economics document that one of the most efficient ways of defending against agricultural products' price volatility, as well as being able to contract their low cycles and take advantage of their high ones (i.e. to stabilise income flows), is to have a broad portfolio of possibilities regarding both production and marketing/sales.

It can thus be said that the challenges to be faced by the Orinoquia region for consolidating its innovation system are related to strengthening its science and technology activities, understood as individuals' collective capability regarding production and applying knowledge. This must be made the central element in the dynamics of the link between science, competitiveness and development; it consists of forming human talent as the starting point for social and economic growth, having clear, quality interdisciplinary formation/training, creating and socialising knowledge. This will provide ongoing advantages for long-term sustainable development, thereby improving agricultural sector productivity as well as its competitiveness and sustainability.

Table 1. General elements regarding the subsystems making up the Colombian Agricultural Innovation System (CAIS)

Subsystem	Coordination	Current situation	Action proposed by law
Colombian Agricultural Research and Technological Development Subsystem (CARTDS)	Colombian Ministry of Agriculture and Rural Development (MARD) and Colciencias	Dispersed efforts and resources due to the lack of a national STI plan for the agricultural sector	Using the Agricultural Science, Technology and Innovation Plan (ASTIP) 2017-2017, as well as its R&D&I agenda, for guiding/orientating the framework regarding agricultural sector STI policy
		Difficulty in coordinating local, regional and national actors, as well as insufficient channels for interlocution/dialogue	Creating and strengthening the following articulation spaces: Local (Municipal Rural Development Councils (MRDC)), Departmental (Agricultural Science, Technology and Innovation working groups) National (CAIS higher council)
Colombian Formation and Training for Agricultural Innovation Subsystem (CFTAIS)	Colombian Ministry of Education	Difficulty in coordinating actors from formal and informal education sectors	Defining the actors forming part of the subsystem led by the Colombian Ministry of Education, such as higher education institutions (HEI), the Colombian Learning/ Training Service (CTS), agricultural colleges and informal education institutions
		Little relevance of formation and training programmes	Ensuring the quality and relevance of formation and training programmes aimed at creating research, technological development, agricultural extension and innovation-related skills
Colombian Agricultural Extension Subsystem (CAES)	Colombian Ministry of Agriculture and Rural Development (MARD)	Difficulty in planning the agricultural extension service and evaluating its impact and gradualness	Creating Departmental Agricultural Extension Plans (DAEP) ⁴ as four-year planning instruments in which every department, in coordination with its municipalities, districts and other CAIS actors, will define the strategic and operational elements for providing an extensión service
		Weak territorial approach to dealing with/addressing the needs of the Orinoquia region regarding agricultural extension	Incorporating the concept of Territorial Innovation System - STI as complex systems emerging in a particular territory established by recognising specific interactions between their biophysical, cultural, institutional and socioeconomic dimensions