

ESTADO ACTUAL DE LA ASISTENCIA TÉCNICA Y SU INCIDENCIA EN EL DESEMPEÑO AGRÍCOLA EN EL DEPARTAMENTO DE BOLÍVAR, COLOMBIA

ACTUAL CONDITION OF TECHNICAL ASSISTANCE AND INCIDENCE ON AGRICULTURE PERFORMANCE IN BOLIVAR, COLOMBIA

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Resumen

Debido a la importancia del sector agrícola y las necesidades de incremento de su productividad y competitividad, el objetivo de este artículo consiste en caracterizar el estado actual de la asistencia técnica entre productores agrícolas de departamento de Bolívar, así como su incidencia en el rendimiento final de sus cultivos. Para ello, se ha acudido a las estadísticas del III Censo Nacional Agropecuario del año 2014, así como a la base de datos del Sistema de Información Agrícola -AGRONET- del Ministry of Agriculture and Rural Development para el periodo entre el año 2010 - 2018. Los resultados arrojan que son pocos los productores agrícolas del departamento de Bolívar que reciben un servicio de asistencia técnica, respondiendo a la tendencia a nivel nacional. Por su parte, no se hallaron diferencias significativas del desempeño agrícola entre los productores agrícolas que reciben el servicio de asistencia técnica respecto a aquellos que no lo reciben.

Palabra clave: Asistencia técnica, desempeño agrícola, desarrollo endógeno, agricultura colombiana.

Abstract

The objective of this article is to characterize the current state of technical assistance among agricultural producers in the department of Bolivar, as well as its impact on the final yield of their crops. For this purpose, the statistics of the III National Agricultural Census have been used, as well as the database of the Agricultural Information System - AGRONET- of the Ministry of Agriculture and Rural Development. The results show that few agricultural producers in the department of Bolívar receive technical assistance service, responding to the trend at the national level. On the other hand, no significant differences in agricultural performance were found between agricultural producers who receive the technical assistance service compared to those who do not.

Keyword: Technical assistance, agriculture performance, endogenous development, Colombian agricultura.

Recibido: 03 de Octubre de 2018/ Aprobado: 15 de Diciembre de 2018



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La revisión por pares es responsabilidad de la Universidad Francisco de Paula Santander Ocaña

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1. Introduction

Agriculture is one of the economic activities that contribute the most to development, sovereignty, food security, as well as to the reduction of poverty, by generating employment in the rural sector of a country (Valdés et al., 2008), hence the importance of technical improvements in agricultural practice (Perfetti et al., 2013). Despite this, the agricultural sector in Latin America in recent years has had a declining behavior, and for this reason investments in research, development, rural education and technical assistance services and infrastructure should continue to be promoted to increase its productivity (Cepal et al., 2017). For the Latin American region, the agreements with the United States become a great challenge, given the uncertainty generated by daily exchanges; however, these countries depend on the growth in demand for raw materials, or *commodities*. Although they have increased their participation in the world market, countries are under pressure to implement measures that further boost trade to meet market demand (Cepal et al., 2017).

Historically, the agricultural sector has been a priority activity in the Colombian economy, given the generation of employment and its contribution to rural development; however, the sector has deficiencies in infrastructure, productivity, and competitiveness in international markets (Lozano y Restrepo, 2015). Due to this, and with the purpose of mitigating the problem and promoting the movement of the sector, the Colombian government has implemented a program that allows farmers to improve the techniques applied in their production system, oriented to their capacities, which is developed under principles that guarantee

productive development (Procasur et al., 2016). This technical assistance service seeks to make the Agricultural Production Units - UPA's- more competitive (Leibovich et al., 2010). Therefore, it is expected that the UPAs that receive the technical assistance service will be more productive than those that do not.

Bolívar, a key department that is part of the Colombian Caribbean region, is classified as one of the world-class departments, as it has diversified production structures with the ability to compete in international markets (Gobernación de Bolívar, 2010). Also, in order to contribute to the improvement of its strategic sectors, the department has worked on its competitiveness plan, proposing medium and long-term goals for the strengthening of all its sectors, including agriculture. (Gobernación de Bolívar, 2010). Among the planned actions is the strengthening of technical assistance in the agricultural sector, in order to increase its national and international competitiveness.

Given the situation, several questions arise for this article, what is the current status of technical assistance at the level of the department of Bolívar? Does the technical assistance service of the department of Bolívar have an impact on your agricultural performance? In this sense, this article's main objective is to characterize the current state of technical assistance and its impact on agricultural performance in the department of Bolívar. To respond to the above, this article has been divided into the following sections: after this introduction, the current situation of the Colombian and Bolívar agricultural sector is described, followed by the theoretical and conceptual framework on the relationship between agricultural technical assistance and

competitiveness, then, in terms of technical assistance. The following section corresponds to the methodology used in this article, followed by the results obtained in terms of technical assistance and its relationship with productivity at the department level. In the end, the conclusions and bibliographic references are presented.

Current situation of the Colombian agricultural sector.

Colombia is a country rich in natural resources, both renewable and non-renewable, among the most important is gold, oil, flora, and fauna. It also has a great variety of crops and forest products, a diversity of climates and tropical forests (OCDE, 2014). The one in charge of the agricultural sector at the national level is the Ministry of Agriculture and Rural Development, which in order to meet the demands of the world market and the growth of the sector, its priority is to invest in innovation and knowledge (Maza Avila, 2016; Procasur et al., 2016). It should be noted that employment in the agricultural sector is a very important factor, in order to alleviate rural poverty (Corredor, 2017). However, the Colombian agricultural sector is subject to several problems, reflected in its productivity, among which is the road infrastructure and access to tertiary roads, the agricultural techniques used by the producers, the quality of life, and the use of the land. (Castaño Giraldo y Cardona Gómez, 2014).

According to Villanueva Mejía (2018), the participation of the annual production of the agricultural sector in the national GDP for the year 2016 contributed to the economy in 9% of the total production. Colombia has 40.3 million hectares for agricultural use, of which 8.5 million are for agricultural use (19.7%) and of these hectares, 83.9% correspond to

agricultural crops (National Administrative Department of Statistics) [DANE, 2016]. In the same way, it is highlighted that approximately 223 products are planted in the country, but a low portion of them - only 12 - represent 86% of the total planted area.

Table 1. Participation (%) of the area sown by products at the national level 2010 - 2018

Productos	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Café	18,74	18,88	19,23	18,97	19,02	18,39	17,09	16,56	18,36	18,33
	%	%	%	%	%	%	%	%	%	%
Maíz	12,46	12,21	12,22	12,38	11,98	11,26	11,95	11,32	7,86%	11,53
	%	%	%	%	%	%	%	%	%	%
Palma de aceite	8,75%	9,71%	10,26	10,42	11,42	11,96	11,91	12,19	14,23	11,23
	%	%	%	%	%	%	%	%	%	%
Arroz	11,08	11,09	10,90	10,89	9,20%	10,79	12,14	12,55	8,26%	10,81
	%	%	%	%	%	%	%	%	%	%
Plátano	8,99%	8,65%	8,99%	8,72%	9,00%	8,78%	8,71%	8,69%	10,62	9,00%
	%	%	%	%	%	%	%	%	%	%
Caña azucarera	4,65%	4,63%	4,70%	4,53%	4,77%	4,76%	4,68%	5,02%	5,80%	4,84%
	%	%	%	%	%	%	%	%	%	%
Caña panelera	5,03%	4,77%	4,81%	4,72%	4,82%	4,53%	4,27%	4,33%	5,12%	4,70%
	%	%	%	%	%	%	%	%	%	%
Yuca	4,73%	4,28%	4,42%	4,63%	4,44%	3,98%	4,02%	3,92%	4,78%	4,34%
	%	%	%	%	%	%	%	%	%	%
Cacao	3,72%	3,86%	3,90%	3,67%	3,89%	3,97%	3,98%	4,10%	4,89%	4,00%
	%	%	%	%	%	%	%	%	%	%
Papa	3,90%	3,69%	3,21%	3,32%	3,40%	3,50%	3,52%	3,35%	2,13%	3,34%
	%	%	%	%	%	%	%	%	%	%
Frijol	2,74%	2,79%	2,56%	2,57%	2,57%	2,40%	2,35%	2,14%	1,31%	2,38%
	%	%	%	%	%	%	%	%	%	%
Banano	1,60%	1,68%	1,67%	1,60%	1,59%	1,64%	1,60%	1,58%	1,83%	1,64%
	%	%	%	%	%	%	%	%	%	%
Otros	13,56	13,70	13,09	13,54	13,87	14,01	13,76	14,20	14,74	13,83
	%	%	%	%	%	%	%	%	%	%
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	99,9%	100,0
	%	%	%	%	%	%	%	%	%	%

Source: Self-made, based on the agricultural information system AGRONET.

Among the most representative products are coffee, corn, oil palm, rice, and banana. Table 1 shows that coffee in the last eight years has maintained its participation above 18.0% percentage points, being the most representative product in Colombia. For its part, corn for 2018 decreased its share with 7.86% in the planted area.

It should be noted that, in the last eight years, the participation of oil palm with respect to the hectares planted has been growing. As Herrera and Cumplido (2015) argue in their research on the implications of oil palm cultivation in the agricultural production structure and food security of María La Baja, the palm has been the product with the highest growth in recent years. In addition, the products with the highest participation at the national level in the number of hectares planted are permanent cycles with a participation of 59%, followed

by transitory products with 35% and annual 6% (Figure 1).

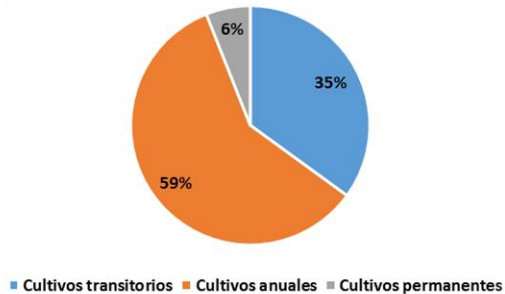


Figure 1. National participation of the crop cycle 2010 - 2018. Source: Self-made, based on the agricultural information system AGRONET.

In terms of technical assistance, only 16.5% declared having received the service, while 83.5% said they had not. Likewise, the III National Agricultural Census of 2014 shows that the types of technical assistance that are mostly offered at the national level are good agricultural practices, marketing, credit, and financing, as shown in Figure 2.



Figure 2. Distribution (%) of UPA in the dispersed rural area registered with technical assistance received, according to the type of assistance. Source: Self-made, based on the statistics of the Third National Agricultural Census.

2. Theoretical framework

The concept of development is defined as a set of aptitudes or capacities intrinsic to each region, which must be discovered for their best use (Berton, 2009). In the case of rural development, (Alfaro, 2013) conceives it as a process where transformation is not only productive but also institutional and social, important bases for the search for the well-being of the population in question. Over the years, agricultural productivity has played an important role in favor of devel (JIA & IICA, 2015). It should be mentioned that productivity is the relationship between the resources used within the production process and the resources obtained (Carro & González, 2012). Agricultural productivity for a region can be conceived, therefore, as the relationship between the results obtained in agriculture with respect to the total factors of production: land, water, capital, among other material inputs (JIA & IICA, 2015). However, agriculture does not consist only in obtaining vegetable products but also includes the care and conservation of the land, considering it the greatest resource for productivity and that will allow the buyer to enjoy a healthy and quality product. (ICA, 2016).

Technical assistance constitutes one of the factors that can support the increase in agricultural productivity, since its objective is aimed at improving the performance of the production of basic foods or activities that have the land as a productive unit, through consultancies related to production, industrialization, production and marketing processes (Cuevas Reyes, Baca del Moral, Cervantes Escoto, & Aguilar Ávila, 2018). Technical assistance is one of the main services required by farmers since access to it contributes to the competitive improvement

of agricultural exports (Landini, 2016). Therefore, and in order to improve the competitiveness of the sector, it is necessary to have policies and technical assistance programs that incorporate new techniques and methods that increase agricultural yields (Castaño Giraldo & Cardona Gómez, 2014), so that it benefits those who dedicate their work to the agricultural exploitation.

In Colombia, technical assistance acquires relevance with Decree No. 2379 of 1991, which in its article No. 3 defines it as a technology transfer service which is provided to small producers through advice, consultancy, training and application of methods that contribute to improving the production systems of rural farms, as well as improving income levels and the productive capacity of the peasant population (Ministry of Agriculture and Rural Development, 1991). Subsequently, Law 607 of 2000, stipulates it as a direct and mandatory service, in addition, it indicates the need to rationalize and coordinate activities that correspond to it, ensuring an expansion, coverage, quality, and relevance of the guidance and accompaniment service (Ministry of Agriculture and Rural Development, 2000).

There are several entities that provide the extension service and technical assistance such as the Municipal Agricultural Technical Assistance Units -UMATA's-, the Provisional Agricultural Management Centers -CPGA-, private companies, agricultural unions and other entities whose business name is the provision of the service (Ministry of Agriculture and Rural Development, 2000).

By 2016, the final agreement was signed to end the conflict and build a stable and lasting peace with the Revolutionary Armed Forces of Colombia FARC. With reference to

the above, the first point of the agreement was the Comprehensive Rural Reform - Towards a new Colombian countryside, in which the creation of the National Plan to promote the solidarity economy and rural cooperative is determined, which will have criteria such as accompaniment, support technical and financial, strengthen productive capacities and instruments for rural development such as technical assistance, education, and training. In this sense, the same agreement, the national government commits to the creation of a national plan for comprehensive technical assistance (Presidencia de la República & FARC-EP, 2016).

3. Methodology

The research in this article is descriptive and correlational, and for its development, the agricultural producers of the 46 municipalities of the department of Bolívar were taken as the population. To do this, the anonymized database of the III National Agricultural Census was used, prepared by the National Administrative Department of Statistics -DANE- in 2014, whose data were published in 2016. The database was also used statistics of the Agricultural Information System - AGRONET-, for the period between 2010 - 2018, in order to characterize the agricultural sector based on the hectares sown, hectares harvested, production levels, main products planted in the region and the crop cycle.

The data collected from the III National Agricultural Census of 2014 for the department of Bolívar was initially 54,346 data, which went through a purification process, in order to eliminate atypical data and surveys that were not answered; from this purification, 31,182 data were eliminated, giving a total of 23,164 final data, which were

used to characterize the current state of technical assistance and its impact on agricultural performance in the department of Bolívar. The variables that were considered for the analysis were the following: Agricultural production, expressed in tons/hectares, Good agricultural practices (X₁), Environmental management practices (X₂), Soil management (X₃), Postharvest management (X₄), Marketing (X₅), Associativity (X₆), Credit and financing (X₇), Business Management (X₈). Table 2 shows the variables used for this article.

Table 2. Definition of variables

Variabes	Indicadores	Fuentes
(X1) Buenas prácticas agrícolas	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(X2) Prácticas de manejo ambiental	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(X3) Manejo de suelos	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(X4) Manejo de poscosecha	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(X5) Comercialización	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(X6) Asociatividad	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(X7) Crédito y financiamiento	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(X8) Gestión empresarial	Tipo de asistencia recibida por los productores	Tercer Censo Nacional Agropecuario
(Y) Producción (Ton/Ha)	Número de toneladas por hectárea	Tercer Censo Nacional Agropecuario

Source: Self-made, based on the III National Agricultural Census of 2014.

4. Results

This article aimed to characterize the current state of technical assistance in the department of Bolívar and its impact on the agricultural performance of the Agricultural Productive Units -UPA's-. In Bolívar, in relation to the planted area, the results show that only nine products represent 93.74% of the total, among these products the most representative are Corn, Cassava, and Oil Palm (Table 3), the latter being the one with the highest growth in recent years. At present, most of the harvested hectares of palm in the entire region are concentrated in the municipality of María La Baja, thus representing 35.08% of its productive structure.

Table 3. Participation (%) of the area planted by-products in the department of Bolívar 2010 – 2018

Productos	2010	2011	2012	2013	2014	2015	2016	2017	2018	Grand Total
Maíz	38.00%	37.24%	38.29%	37.03%	37.63%	34.73%	32.20%	30.97%	23.35%	36.35%
Yuca	18.80%	16.93%	15.38%	17.80%	17.60%	16.57%	16.46%	15.40%	20.94%	17.23%
Palmó de Aceite	10.14%	12.89%	12.21%	14.98%	14.81%	16.74%	17.07%	18.00%	21.47%	13.58%
Ajone	10.89%	11.99%	14.75%	12.25%	8.05%	10.10%	12.62%	15.07%	9.69%	11.43%
Ñame	7.64%	7.21%	4.81%	4.80%	5.80%	5.31%	6.10%	5.59%	7.40%	6.19%
Cacao	2.81%	2.88%	2.98%	2.95%	3.11%	3.42%	3.12%	3.47%	4.24%	2.97%
Plátano	2.21%	2.51%	2.66%	2.20%	2.26%	2.50%	3.27%	3.87%	4.70%	2.56%
Frijol	1.64%	1.80%	1.61%	1.36%	1.54%	1.58%	1.33%	1.18%	1.19%	1.55%
Aguacate	1.73%	1.77%	1.47%	1.49%	1.45%	1.46%	0.99%	1.19%	1.42%	1.53%
Otros	6.20%	4.78%	5.75%	6.03%	6.82%	7.58%	6.84%	5.25%	5.54%	6.60%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Self-made, based on the statistics of the Third National Agricultural Census (2014).

The growth of this crop is expected to continue, to the detriment of the rest of the crops, due to the national regulatory framework, including Law 939 of 2004 - amending Law 818 of 2003 - which provides income exemption benefits for income derived from the use of late-yielding crops - which includes cocoa, rubber, oil palm, citrus, and fruit crops - for 10 years after the start of production (Herrera Seba & Cumplido Hernández, 2015).

On the other hand, the participation of the crop cycle in the harvested area was analyzed and, on average, in Bolívar the reality of permanent crop cycle products such as palm oil is much more accentuated, having an average of 58.69% participation in the harvested area, while products with an annual cycle (5.60%) and a 35.71% are products with a transitory cycle (Table 4). The previous results show the richness of the soil in the department, in general, as well as concern about the strong rise in the growth of oil palm, which will require taking measures that contribute to the sustainable development of the region, without putting your food safety at risk.

Table 4. *Table 3 Participation (%) of the area planted by products in the department of Bolívar 2010 – 2018*

Crop cycle	Average
Permanent	58,69%
Transient	35,71%
Annual	5,60%
Total	100%

Source: Self-Made, based on the agricultural information system AGRONET (2010 – 2018).

As for the Bolivarian producer, at the national level the results show that very few producers indicate agriculture as a profitable activity. Therefore, and to generate additional resources, necessary to cover household expenses, 61.11% of producers carry out parallel activities, such as bricklaying, animal husbandry or commercial activities, characterized by being sporadic and informal, known in Colombia as a "Rebusque"(Maza Avila, 2016).

On the other hand, although there is a formality in the possession of the UPAs, when observing the legal nature for the exercise of their productive activity, the levels of business informality are evident. At the Bolívar level, 99.8% of the producers residing in rural areas are natural persons, with 64.9% concentrated in UPAs smaller than 5 hectares.

At the regional level, the agricultural production of the municipality is characterized by its low levels of technification and by the intensive use of labor in all phases of agricultural production. It is usual for the workforce to be made up of family members - parents, siblings, nephews, among others - and only turn to an additional workforce when the activity to be carried out requires it, something that happens more frequently in the ground preparation phase.

The above results may have an impact on support and technical assistance. In fact, in terms of assistance, the situation is not different from the national one, since only 10.9% of the registered producers' state that they have received technical assistance, that is, of the total number of respondents in the department of Bolívar 49,241, only 5,383 producers declared having received technical assistance (Table 5).

Table 5. *Percentage of total area surveyed in the department of Bolívar with technical assistance received*

Department	Total	Received	Not received
Total	49.241	5.383	43.858
Bolívar	100.0%	10.9%	89.1%

Source: Self-Made, from the statistics of the Third National Agricultural Census (2014)

According to the III National Agricultural Census, the type of technical assistance, for those who did receive it, was concentrated, above all, on good agricultural practices and assistance in credit and financing, with those aimed at post-harvest management is almost nil, commercialization, associativity, business management, aspects that are key to leverage the production process and, in addition, achieve better profit margins (Table 6).

Table 6. Total UPAs in the dispersed rural area registered with technical assistance received in the Department of Bolívar, according to a type of assistance

Type of technical assistance	No.
Good farming practices	4.769
Credit and financing	2.504
Soil management	444
Environmental management practices	275
Commercialization	255
Postharvest handling	218
Associativity	65
Business management	42

Source: Self-Made, based on statistics from the Third National Agricultural Census (2014)

After carrying out an analysis of the average yield measured in Ton / Ha of the total UPA's surveyed in the department of Bolívar, it was found that the producers who do not receive the technical assistance service are 0.54 points more productive than those who declared have received technical assistance service (Table 7).

Table 7. Average total performance of the UPA's regarding the perception of the technical assistance service

Receive technical assistance	Average Performance (Ton/ Ha)
Yes	2,83
No	3,37
Total	3,27

Source: Self-Made, based on the statistics of the Third National Agricultural Census (2014)

In fact, the results of the calculation of the Determination Coefficient (R2) for each of the analyzed variables, shows that the explanatory variables have little incidence with the dependent variable, since the R2 values are closer to zero and, therefore, its significance is relatively null and the model cannot be explained. (Table 8).

Table 9. Regression statistic - R2 coefficient of determination

Variables	R2
X1	0.002444
X2	0.002376
X3	0.002376
X4	4.33E-05
X5	1.02E-05
X6	0.002723
X7	0.001223
X8	0.001136

Source: self-made.

5. Discussions

This work shows that the technical assistance received has a minimal impact on the performance of UPAs. These results are in tune with the conclusions of the work carried out by Maza, Batista & Rodríguez (2018) for the UPAs of the Colombian Caribbean region. It is worth noting, however, that both the work of Cuevas et al. (2018) carried out in production units in Mexico, such as that of Leibovich et al. (2010) in their research on the agricultural transformation process in Colombia, state that the UPAs that receive the technical assistance service are more productive compared to those that do not receive this service.

6. Conclusions

This article aimed to characterize the current state of technical assistance among agricultural producers in the department of Bolívar, as well as its impact on the final yield of their crops. To do this, the statistics of the III National Agricultural Census of 2014 were used, as well as the database of the Agricultural Information System - AGRONET- of the Ministry of Agriculture and Rural Development for the period between the years 2010 - 2018. The results

found of the characterization of the current situation of the agricultural sector, in terms of technical assistance and the analysis of the total average performance of the UPA's that they receive and not the technical assistance service, allow us to conclude that there is no greater relevance of the incidence of the service of technical assistance regarding agricultural performance, measured in tons produced per hectare. The foregoing could be verified by observing the minimum incidence of each of the types of technical assistance in the performance of UPA's.

It should be clarified that the technical assistance service continues to be considered by the authors as an important factor in the modernization of the Colombian countryside, in order to improve competitiveness at the international level, so that it is reflected in a better quality of life of the rural population dedicated to agriculture. Therefore, it is important to continue analyzing the quality and relevance of the technical assistance provided to Bolivarian agricultural producers, as well as other factors that affect agricultural performance, such as machinery, the effects of climate change, the socio-political situation of the country and the behavior of young people regarding the interest of developing agricultural activities as the main source of income.

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