

PalArch's Journal of Archaeology
of Egypt / Egyptology

**PROFITABILITY ANALYSIS BY AGRICULTURAL SUBSECTOR IN
COLOMBIA AND ITS BUSINESS FEATURES FOR THE 2009-2013 TERM**

Milena E. Arias Robles¹, Jhon J. Feria Díaz², Teobaldis Mercado Fernandez³

¹Corporación Colombiana de Investigación Agropecuaria - AGROSAVIA. Coordinadora de Innovación Regional en la Corporación Colombiana de Investigación Agropecuaria - AGROSAVIA. Centro de Investigación Turipaná, sede El Carmen de Bolívar – Km 1 Vía Plato - Magdalena, El Carmen de Bolívar, Colombia. Orcid: <https://orcid.org/0000-0002-3468-993X>.

²Universidad de Sucre, Facultad de Ingeniería. Cra. 28 #5-267, Puerta Roja, Sincelejo, Colombia.

³Universidad de Córdoba, Facultad de Ciencias Agrícolas. Carrera 6 No. 77-305, Montería, Colombia.

Milena E. Arias Robles¹, Jhon J. Feria Díaz², Teobaldis Mercado Fernandez³, Profitability Analysis By Agricultural Subsector In Colombia And Its Business Features For The 2009-2013 Term, PalArch's Journal Of Archaeology Of Egypt/Egyptology 18(4). ISSN 1567-214x.

Keywords: Return on assets (ROA), operating margin, asset turnover, business management.

ABSTRACT:

A balanced and refined data panel of 4,412 companies part of the Sistema de Información y Reporte Empresarial, SIREM, [Business Information and Report System] was built to analyze profitability behavior by agricultural subsector in Colombia and its business features for the term of 2009-2013. Return indicators on assets - ROA, operating margin and turnover were calculated with this. Positive and negative fluctuations in agricultural profitability were estimated with great opportunities for improvement for the business management. It is noted that the export-type subsectors make inefficient use of their assets, restraining sustained increase of business profitability.

1. Introduction:

This study focuses on the Colombian agricultural sector, whose definition from the Royal Academy of the Spanish Language, RAE (2016) involves activities to produce raw materials and food from agriculture. This sector is key for the country's economic development. In 2019, it added 3.9% to the GDP (DANE, 2020), with an export growth of 2.43% (Portfolio, 2019), and unemployment decrease in rural areas (DANE, 2017).

Nonetheless, according to the World Bank (2014), Castaño & Cardona (2014), all productive potential of the Colombian agricultural sector has not been fully exploited. The National Development Plan, "Prosperity for all 2010-2014", identified low diversification, openness and stability in new markets, reduced confidence from foreign investment, and regional disparities in technological infrastructure in rural areas (DNP, 2011) as restraints for the productivity and profitability of the national agricultural sector. Consequently, gathering efforts on those variables under control of the agricultural entrepreneur is a priority to make more profitable their productive units and the possibilities of self-financing.

When speaking of profitability, we talk about efficiency in asset use compared to expenses involved in the production of a series of activities in a fixed period (Amat, 2005). Profitability estimation allows to measure business success (Chávez, 2005) by making known the benefit resulted from the investment for decision-making purposes (Anthony, Robert & Govindarajan, 2003). Without an adequate profit margin, the company would be in trouble to normally operate and attract external capital leverage (De La Hoz et al., 2008), and in the future, its equity growth would be also reduced (Chávez, Agueda, 2005).

Profitability measurement uses ratios or economic and financial indicators that intervene in different areas of a company (Pacheco et al., 2002). Among the reference studies, the one by Selling & Stickney (1989) stands out, who obtained low turnover indicators in those industries with high entry barriers and fixed costs; while industries with low capital intensities and mass consumer products showed higher turnover indicators and lower margins.

On the other hand, Choi & Phan (2014) infer about the strategies of intense competition occurring in adverse environments, of difficult positioning and with restrained profit margins, while other authors focus their studies on Spanish agricultural cooperatives that acquire higher profit margins for developing product marketing activities with lower investment of assets or short cycles (Lajara-Camilleri & Mateos-Ronco, 2012; Gomez-Limon et al., 2003; Montegut et al., 2002; Vidal et al., 2000).

On investing in intangible assets to increase profitability, authors such as Chun et al. (2015) and Goddard et al. (2005) argue that during crisis or stagnation periods of business income growth, it is favorable to strengthen investment in research and development (R&D) complemented with technology transfer strategies. Zouaghi et al. (2017) showed that agricultural businesses in Navarra close to technology centers and airports have a decreased profitability while in more industrialized sectors such as the food business, it increases. Although agricultural cooperatives in Castile & Leon are 1.41% more profitable in the use of assets (Gómez-Limón et al., 2003).

Within the national studies on profitability, the one by Gutiérrez, Castaño & Asprilla (2014) was reviewed. They point out the broad difficulties faced by agricultural producers in Colombia in accessing credit lines offered by banks and guaranteed by the government. Conversely, though,

DANE (2016) indicates positive advances in access to sources of financial investment in short-cycle crops, and according to Echavarría et al. (2017), it has produced a favorable effect on the profitability of the country's agricultural production units.

In terms of self-financing, Sánchez (2002) highlights that an adequate business profitability analysis allows to prevent the risk of financial insufficiency to meet credit and operational obligations. In this measure, during the term of 2011-2015, Brazil obtained a notorious growth in the agricultural sector as a direct effect of business accessibility to credit, while in Colombia, despite making a large contribution to GDP (6%), showed a low production that restrained sector expansion and investment in new lines (Gil & Cruz, 2018).

Finally, this research aims to analyze profitability behavior by agricultural subsector in Colombia and its business characteristics during the 2009-2013 term.

2. METHODOLOGY:

This research study used the analytical method to know causes and effects of the behavior of profitability indicators in the Colombian agricultural sector. Data for analysis was taken from the accounting records reported in the financial statements from the agricultural businesses that filed reports during the term of 2011–2013 before the Superintendence of Industry and Trade of Colombia.

These financial statements were obtained from the Information and Business Report System - SIREM (<http://sirem.supersociedades.gov.co:9080/Sirem2/>) as of December 31 of each year and their report is under surveillance, control, and inspection by this Superintendence of Industry and Trade of Colombia.

2.1. Category and sample selection by agricultural economic activity:

Only the economic activities belonging to the group of “Specifically agricultural production” were selected from SIREM (See Table 1), which in turn, were subdivided into nine categories or economic subsectors within code 01 according to the International Standard Industrial Classification ISIC (Rev. 3.1 AC).

Table 1 : Classification and description by type of economic activity

ISIC Class	Agriculture Subsector
0111	Growing of Specialty Coffee
0112	Specialized Growing of Cut Flower and Nursery Products
0113	Specialized Growing Banana and plantain
0114	Specialized Growing of Sugar Cane
0115	Specialized Growing of Cereals and oilseeds
0116	Specialized Growing of Vegetables and Legumes
0117	Specialized Growing of Fruits (except bananas and plantains), nuts, drinkable plants (except coffee) and spices.
0118	Specialized Growing of Other Crops Not Previously Classified
0119	Agricultural Growing in Non-Specialized Units.

Source: International Standard Industrial Classification of all economic activities (ISIC)

Rev. 3.1 A.C.)

Accounting information was taken in total from 4,650 agricultural businesses located in 20 departments of Colombia and in Bogotá Distrito Capital as one more region. The SIREM did not find a record of accounting information for businesses in the agricultural sector located in the Amazonas, Arauca, Caquetá, Chocó, Guainía, Guaviare, Putumayo, San Andrés y Providencia, Sucre, Vaupés and Vichada departments.

Once the observation matrix of the agricultural businesses was established, the balance sheet and the income statements were taken for the selection of the analysis variables, from where the outliers and those economic and financial accounts not of interest to the study were eliminated. Finally, an unbalanced panel of 4,412 businesses from the Colombian agricultural sector that report to the SIREM was obtained.

2.2. Description of variables and construction of indicators:

As variables dependent on business profitability, return on assets (ROA), operating margin, and turnover were selected. These indicators were chosen following the criteria of previous studies made by Pindado & Alarcón (2018), Amad (2005), Skolnik (2002), Selling & Stickney (1989), Sánchez-Segura (1994), Fairfield & Yohn (2001) who consider them as a standard within investigations of this type, and whose variables have been homologated under the structure of the International Financial Reporting Standards (IFRS).

The Return on Assets indicator (ROA), allows to measure the rate with which the company generates sales with fixed assets, and describes the economic profitability to obtain higher performance and productivity margins of the business assets (Amat, 2005). The indicator estimation is calculated by mathematical transformation with the following equation:

$$ROA = \frac{\text{Net Income}}{\text{Total Assets}} \times 100$$

The operating margin indicator is used to measure the proportion of money that a company earns regarding sales and is considered an indicative of the possibilities of self-financing for its production processes (Amat, 2005). The indicator is estimated by applying the following equation:

$$\text{Operating Margin} = \frac{\text{Operating Profit}}{\text{Sales}} \times 100$$

Finally, the turnover indicator allows calculating the rate of sales obtained from assets and depends on the type or types of products that the company generates for the frequency of production of the final product in terms of time; i.e., high turnovers trigger higher sales, which are associated in turn with short production cycles with higher turnover, whereas low turnovers will have the opposite behavior. The following equation is applied to obtain this indicator:

$$\text{Turnover} = \frac{\text{Net Sales}}{\text{Total Assets}}$$

Both the operating margin and turnover are indicators of the financial profitability factors of a company, while the ROA represents the economic profitability, indicators that together allow the employer, government and sectoral unions to establish management strategies and corrective measures for an adequate performance of their economies.

3. RESULTS AND DISCUSSION:

The employed sample corresponds to 94.88% of the total agricultural business in Colombia, most of which are in the capital city and in the departments with the greatest industrial, technological development and contribution to the national GDP (36% in Bogotá, 23.84% in Valle del Cauca, and 16.21% in Antioquia).

Table 2: Descriptive statistics of profitability indicators

Year	N° Companies	ROA		Operational Margin		Turnover	
		Min	Max	Min	Max	Min	Max
2009	851	-6,373	36,900	-4,296	1,000	0,000	50,170
2010	922	-15,900	0,683	-284,200	1,000	0,000	94,300
2011	922	-1,076	0,700	-279,600	1,000	0,000	6,822
2012	868	-2,651	0,682	-16,830	1,000	0,000	5,572
2013	849	-0,618	1,391	-7,108	1,000	0,000	5,214

Source: Own elaboration based on accounting information from SIREM

Table 2 shows fluctuations in positive and negative values of the profitability indicators throughout the term, with similar values in the maximum operating margin and minimum turnovers. The number of companies remained the same only between 2010 and 2011.

Regarding the ROA, all the minimum values showed a negative trend in sector profitability, while the maximum values were all positive with a certain percentage consistency except in 2009 where agricultural productivity increased in a notorious and irregular way. The negative values of the ROA indicator according to Amat (2005) allow us to infer that agricultural businesses in Colombia had difficulty to meet their financial obligations in a period of less than one year, a situation that in the future could lead to the insolvency from the company to operate in the sector, while when the return on assets was positive, the entrepreneur was able to keep the company operational and achieve the highest benefits for shareholders (2009 and 2013).

The operating margin was negative as the ROA was in terms of money earned from sales in the agricultural sector, and sales rate obtained from agricultural assets showed high rotations between 2009 and 2010, but with extreme drops in the following years. The annual variations between minimums and maximums merit an analysis discriminated by type of economic activity and its correlation with other factors external to the productive unit that could influence the country's agricultural behavior e.g. climate change, public order, rise in the dollar price, economic recession, signing of trade agreements with stronger economies, and so on).

3.2. Profitability analysis by agricultural subsector:

Below is a breakdown of the behavior and comments of the economic and financial indicators of the nine agricultural activities in the country for the entire period.

Table 3: ROA indicator by type of agricultural activity

Agricultural Subsector	2009	2010	2011	2012	2013
Growing of Specialty Coffee	0,882	-0,205	-0,014	0,012	0,011
Specialized Growing of Cut Flower and Nursery Products	-0,002	-0,114	-0,024	-0,038	0,033
Specialized Growing of Banana and Plantain	0,022	0,0117	0,007	-0,007	0,007
Specialized Growing of Sugar Cane	0,011	0,044	0,04	0,0278	0,0411
Specialized Growing of Cereals and Oilseeds	0,032	0,026	0,038	0,033	0,0339
Specialized Growing of Vegetables and legumes	0,041	-0,001	-0,029	-0,035	0,014
Specialized Growing of Fruits (Except bananas and plantains), nuts, drinkable plants (except coffee) and spices	-0,081	0,042	0,003	0,019	0,0135
Specialized Growing of other Crops n.e.c.	0,053	0,007	0,08	0,045	-0,002
Agricultural Growing in Non-Specialized Units	0,058	0,002	0,024	0,001	0,023

Source: Own elaboration

Table 3 confirms that performance in the use of productive assets varies depending on type of agricultural activity to obtain better profitability. Nonetheless, it is inferred that those agricultural subsectors oriented to exports (specialized growing of coffee, cut flowers, bananas, and so on) presented negative profitability indicators in response to a greater use of assets to meet the market quality standards, a situation that merits further study at a more detailed level. The previous irregular behavior expressed in ROA justifies corrective actions and that, based on the concepts of business analysis from Amat (2005), shows inefficiency in the management of assets in the Colombian agricultural sector. This restricts the entrepreneur to meet the financial costs of the operating debts acquired, the firm capitalization, and to obtain the economic dividends desired by the shareholders.

Table 4: Operating margin by type of agricultural activity

Agricultural Subsector	2009	2010	2011	2012	2013
Growing of Specialty Coffee	0,011	0,014	0,017	0,015	-0,119
Specialized Growing of Cut Flowers and Nursery Products	0,014	-0,015	0,004	-0,001	0,013
Specialized Growing of Banana and Plantain	0,013	-0,011	-0,004	0,009	0,009
Specialized Growing of Sugarcane	0,118	0,116	0,118	0,096	0,109
Specialized Growing of Cereals and oilseeds	0,053	0,056	0,06	0,057	0,049
Specialized Growing of Vegetables and Legumes	0,056	0,039	0,012	0,018	0,057

Specialized Growing of Fruits (except bananas and Plantains), nuts, drinkable plants (except coffee) and spices	0,022	0,039	0,037	0,031	0,043
Specialized Growing of other crops n.e.c.	0,004	0,019	0,061	0,05	-0,006
Agricultural Growing in Non-Specialized Units	0,056	0,053	0,066	0,067	0,079

Source: Own Elaboration

The operating margin indicators shown in Table 4 reflect the heterogeneity of the sales of agricultural businesses in the country, with a positive trend but not always increasing throughout the term. The negative behavior in several years stands out for the subsectors of specialized production of bananas and plantain, and for the specialized production of cut flowers and nursery products. According to Choi & Phan (2014), this scenario reflects that both economies serve the international market whose exports face more aggressive competitive environments, with more rigid quality standards, restraining the profit margin for investors.

Table 5: Asset turnover by type of agricultural activity

Agricultural Subsector	2009	2010	2011	2012	2013
Growing of Specialty Coffee	0,294	0,126	0,188	0,114	0,101
Specialized Growing of Cut Flower and Nursery Products	1,260	1,320	1,291	1,229	1,448
Specialized Growing of Banana and Plantain	0,615	0,552	0,463	0,453	0,50
Specialized Growing of Sugar Cane	0,222	0,201	0,178	0,066	0,135
Specialized Growing of Cereals and Oilseeds	0,414	0,341	0,399	0,316	0,257
Specialized Growing of Vegetables and Legumes	0,813	0,795	0,899	1,067	1,177
Specialized Growing of Fruits (except bananas and plantains), nuts, drinkable plants (except coffee) and spices	0,376	0,293	0,262	0,301	0,219
Specialized Growing of other Crops n.e.c.	0,247	0,226	0,212	0,213	0,117
Agricultural Growing in Non-Specialized Units	0,254	0,188	0,231	0,204	0,177

Source: Own Elaboration

Table 5 shows the evolution of the nine agricultural economic activities that mostly have positive asset turnovers from 2009-2013. It is found that turnover of assets is directly related to the productive cycle of agricultural activity and technology use (Castaño and Córdoba, 2014). The dynamic behavior in the use of the asset to accelerate sales of the specialized production of cut flower and nursery products stands out (with 12.6% in 2009 and 14.48% in 2013), followed by the specialized production of vegetables and legumes (with 8.13% in 2009 and closing the period

with 11.17%). These economic activities have short turnovers of their assets, sale increases of the final product, and greater administrative liquidity.

4. CONCLUSIONS:

Accounting information from 2009-2013 of agricultural businesses in Colombia laying in the Superintendence of Societies allowed to explore the differences in the behavior of the profitability indicators by subsection. Generally, the agricultural sector of the country does not make an adequate use of its assets that allows to improve profitability over time; providing an opportunity to improve the administrative management for the entrepreneur. Nonetheless, in those agricultural subsectors with short-cycle productions, there is an acceleration of sales and incremental turnovers of the profit margin of their shareholders, making them more competitive and flexible to the variants of the export-type market.

It is suggested to combine actions for economic and financial improvement within the Colombian agricultural company, such as to make efficient use of productive resources to reduce expenses, acquire more financing with formal banks and government incentives that reduce the initial investment, concentrate sales on products and services with a higher profit margin, in research, development and innovation of products/processes/services that shorten the production cycle, and increase commercial differentiation of more innovative agricultural products along with more aggressive marketing strategies that allow to sell faster and position brands in the market.

5. ACKNOWLEDGMENTS:

The Corporación Colombiana de Investigación Agropecuaria - AGROSAVIA, provided part of the dedication time of the researcher Milena Arias for developing this research study.

REFERENCES:

- Amat, O. (2005). Claves del análisis de empresas. *Revista de Contabilidad y Dirección*, 2, pp. 13-51.
- Banco Mundial. (2014). Datos. Consumo de fertilizantes (kilogramos por hectárea de tierras cultivables). Recuperado de <http://datos.bancomundial.org/indicador/AG.CON.FERT.ZS/countries?display=default>
- Castaño, N. y Cardona, M. (2014). Factores determinantes en la inestabilidad del sector agrícola colombiano. *Revista de Investigación en Administración, Contabilidad, Economía y Sociedad*. En-Contexto N° 02. Medellín – Colombia. pp. 91-107
- Choi, Y. y Phan, P. (2014). Exploration, exploitation, and growth through new product development: The moderating effects of firm age and environmental adversity. *IEEE Transactions on Engineering Management*, 61(3), pp. 428-437. DOI: <https://doi.org/10.1109/TEM.2014.2310633>
- Chun, D., Chung, Y. y Bang, S. (2015). Impact of firm size and industry type on R&D efficiency throughout innovation and commercialization stages: evidence from Korean manufacturing firms. *Technology Analysis & Strategic Management*, 27(8), pp. 1-15. DOI: <https://doi.org/10.1080/09537325.2015.1024645>

- DANE - Departamento Administrativo Nacional de Estadístico. (2020). Boletín Técnico Producto Interno Bruto (PIB) IV Trimestre de 2019. Recuperado de https://www.dane.gov.co/files/investigaciones/boletines/pib/bol_PIB_IVtrim19_produccion_y_gasto.pdf
- DANE - Departamento Administrativo Nacional de Estadística. (2016). Tercer censo nacional agropecuario: Hay campo para todos. Bogotá.
- De La Hoz Suárez, B., Ferrer, M. y De La Hoz-Suárez, A.. (2008). Indicadores de rentabilidad: herramientas para la toma de decisiones financieras en hoteles. Universidad del Zulia, Maracaibo, Venezuela. *Revista de Ciencias Sociales*, XIV (1), pp. 88-109.
- DNP – Departamento Nacional de Planeación. (2011). Plan Nacional de Desarrollo (PND) Prosperidad para todos 2010-2014. Resumen ejecutivo. Recuperado de <https://colaboracion.dnp.gov.co/CDT/PND/Resumen%20Ejecutivo%20Ultima%20Version.pdf>
- Echavarría, J., Villamizar-Villegas, M., Restrepo-Tamayo, S. y Hernández-Leal, J. (2017). Impacto del crédito sobre el agro en Colombia: Evidencia del nuevo Censo Nacional Agropecuario. Borradores de Economía, Banco de la República. N°1020. Recuperado de https://www.banrep.gov.co/docum/Lectura_finanzas/pdf/borradores_de_economia_1020.pdf
- Fairfield, P. y Yohn, T. (2001). Using asset turnover and profit margin to forecast changes in profitability. *Review of Accounting Studies*, 6(4), pp. 371-385.
- Goddard, J., Tavakoli, M. y Wilson, J. (2005). Determinants of profitability in European manufacturing and services: evidence from a dynamic panel model. *Applied Financial Economics*, 15(18), pp. 1269-1282. Recuperado de <https://doi.org/10.1080/09603100500387139>
- Gómez-Limón, J., Casquet, E. y Atance, I. (2003). Análisis económico-financiero de las cooperativas agrarias en Castilla y León. CIRIEC-España, *Revista de Economía Pública, Social y Cooperativa*, 46, pp. 151-189.
- Lajara – Camilleri, N. y Mateos-Ronco, A. (2012). Estructura financiera y logro empresarial en cooperativas agrarias: una aproximación empírica. *Economía Agraria y Recursos Naturales (Agricultural and Resource Economics)*, 12(2), pp. 77-101.
- Montegut, Y., Sabaté, P. y Clop, M. (2002). Análisis económico-financiero de las cooperativas agrarias productoras de aceite de oliva de la «D.O. Garrigues» (Lleida, España). *Investigaciones Agrarias: Producción Vegetal*, 17 (3), pp. 423-440.
- Pacheco, J., Castañeda, W. y Caicedo, C. (2002). *Indicadores Integrales de Gestión*. Editorial McGraw Hill. Colombia, pp. 184
- Pindado, E. y Alarcón, L. (2015). Factores de rentabilidad en la industria cárnica de Castilla y León. *Revista Española de Estudios Agrosociales y Pesqueros*, 240, pp. 39-75.

- Portafolio. (2019). Las exportaciones del agro sacaron la cara el año pasado. Recuperado de <https://www.portafolio.co/economia/las-exportaciones-del-agro-sacaron-la-cara-el-ano-pasado-538321>
- RAE - Real Academia Española. (2016). Diccionario de la Lengua Española. Recuperado de <http://www.rae.es/>.
- Sánchez, J. (2002). Análisis de Rentabilidad de la empresa. Recuperado de <http://www.5campus.com/leccion/anarenta>
- Sánchez-Segura, A. (1994). La rentabilidad económica y financiera de la gran empresa española: Análisis de los factores determinantes. *Revista Española de Financiación y Contabilidad*, 78, pp. 159-179.
- Selling, T. y Stickey, C. (1989). The effects of business environment and strategy on a firm's rate of return on assets. *Financial Analysts Journal*, 45(1), pp. 43-68.
- Skolnik, R. (2002). Operating Return Trends. *New York Economic Review*, 33(1), pp. 42-50.
- Vidal, F.; Del Campo, F. y Segura, B. (2000). Caracterización empresarial del cooperativismo de comercialización hortofrutícola de la Comunidad Valenciana: un análisis provincial. *CIRIEC-España, revista de economía pública, social y cooperativa*, 34, pp. 71-94.
- Zouaghi, F., Sánchez-García, M. y Hirsch, S. (2017). What drives firm profitability? A multilevel approach to the Spanish agri-food sector. *Spanish Journal of Agricultural Research*. 15 (3), pp. 3-15