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Analysis Of The Economic Impact Of Organic Certification Of Coffee (Coffea Arabica) In The Agricultural Cooperative "Alta Montaña" At Rodríguez De Mendoza Province In The Region Of Amazonas-Peru

Vicente M. Castañeda Chávez[1*], Alex L. Guivin Guadalupe[1], Julio Rabanal Del Aguila[1]

[1]Institute of Agri-business, Toribio Rodríguez de Mendoza National University in Chachapoyas, Amazonas-Peru

Summary:- Objective and purpose of the study: *The objective of the investigation was to determine the economic impact of the organic certification of coffee (Coffea arabica) in the associated coffee growers of the Agricultural Cooperative "Alta Montaña" in the province of Rodríguez de Mendoza, Amazonas region-Peru.*

Materials and methods: *The research was carried out using a survey diagnosis method and the validation of interviews for a finite population of 108 producers from a total of 150 associated coffee growers. For this, a questionnaire provided by Aguilera (2012) was used and adapted according to the parameters of national and international instruments of the certifying bodies of organic coffee production.*

Results: *The study determined that the index of the economic impact of the organic certification of coffee is 96, 30% which turns out to be higher than the minimum limit established to be positive (76%).*

Conclusions: *Organic certification of coffee provides a positive economic impact to the cooperative coffee growers.*

Keywords: *Coffee, High Mountain, economic impact, organic certification, profitability, quality of life.*

Introduction

According to figures provided by MINAGRI (2018), coffee is the first agricultural export product in Peru, in turn Peru is the seventh exporting country of this product worldwide and the second at the level of organic coffee. The figures of the IV National Agricultural Census of the year 2012 (INEI, 2013), show that of a total of 25 regions of the country, coffee is produced in 15 of them, occupying approximately 223 thousand families, that grow around 425 thousand hectares of coffee. However, only 7 of these regions (Junín, San Martín, Cajamarca, Cusco, Amazonas, Huánuco and Pasco) account for 91% of producers and the arable area. In recent years, coffee production in the country fluctuated between 250 thousand and 345 thousand metric tons per year. According to the data provided by USDA-IICA (2016), of this total, it is Estimated that 95% of the production is destined for international markets. The JNC (2016), indicates that Peru has 155 thousand hectares of certified coffees, or 36, 50% of the total. These figures have concluded-as we said above- that Peru now occupies second place worldwide in the production of organic coffee, which according to Castrillón, et al (2017), constitutes a strong competitive advantage that must be strengthened with the purpose of placing it in first place; this is not impossible to achieve, since according to Bayona and Púñez (2009), Peru is a mega-diverse country, which has a variety of microclimates, natural soil conditions and an ancestral tradition of organic farming.

In the Amazonas region, where the study was conducted, coffee is one of the most economically

important crops. In fact, according to MINAGRI (2017), 6 of the 7 provinces produce coffee, including: Luya, Utcubamba and Rodríguez de Mendoza with a production of 8, 80; 7,00 and 3,40 metric tons of coffee per year to 2016.

The JNC (September, 2016), announced that the Amazonas region occupies fifth place at the national level with regard to the cultivated area, that is, 10% of the total.

According to ODEPA (2011), organic production - in general - despite its smaller relative size, has spread throughout the planet, reaching both rich and poor nations, in fact of the 142 countries around the planet that grow organic products in commercial quantities, at least 95 are developing countries, thus becoming a real alternative to improve the income of small farmers.

Díaz and Willems (2017), argue that in Peru coffee is grown by small producers, who drive between one and five hectares and represent 85% of the total coffee farmers. They conduct their farms with a rather precarious technological level, and only 20% are associated, generally in cooperatives, which produce and export giving priority to the organic certification of their plantations and the special coffees. This situation would explain, according to MINAGRI (July, 2018), why the majority have serious difficulties in accessing the various agricultural goods and services showing a low capacity to face challenges of different kinds such as those derived from climate change, from pest attack, of the presence of new competitors in a more interconnected global market, among others. For Becerra, et al (2006), the lack of organization of the producers generates a low management capacity, which added to an oligopolistic market, limits the possibility of obtaining fair prices for the product, consequently the income does not compensate the expenses.

The population studied in this research was made up of the associated producers of the Agricultural Cooperative "Alta Montaña" located in the province of Rodríguez de Mendoza in the Amazonas region.

The objective of the study was to analyze the economic impact of organic certification as a profitable option for the coffee grower members of this cooperative. Regarding the importance of the subject, there is a wide range of research that we could cite, as is the case -for example- of Aguilar (2012), in whose opinion the advantages of certification translate into greater financing possibilities, better Coffee prices, organizational capacity, technical knowledge in organic production, access to housing projects, greater attention to health and non-dependence and exposure of chemical products. These effects, in sum, contribute to a better quality of life and well-being of certified producers and their families; or the case of Rio (2016), for whom the debate on the effectiveness of certifications as strategies to alleviate poverty remains open. According to him, although certifications can generate higher levels of gross income; to improve the well-being of the producer and ensure the continuation of these, other factors such as expenses, consumption and additional costs incurred with the certification should be analyzed. At the household level. For Herrera (2006), coffee farms managed with organic production generate a medium level of positive impacts on environmental components, reporting benefits to the environment and economic income to the community. The negative impacts identified and evaluated (in his research work) are relatively low, due to their punctual nature and the local scope of their effects. With the implementation of ecological techniques, 80% of coffee growers with organic production have improved economic income, as well as quality of life.

Materials and methods

The research was carried out in the Agricultural Cooperative "Alta Montaña" located at Rodriguez de Mendoza province in the region of Amazonas and involved 150 coffee members of the cooperative. This province is located geographically at 1295 m. s. n. m .between the coordinates 6°18'00"S and 77° 23' 00" W. Due to its location in the jungle in the northeastern part of the Andean

mountains, it offers very suitable land for ecological cultivation of coffee and especially organic coffee that is the main source of work for smaller farmers.

The study was of the descriptive-explanatory-transversal type with a non-experimental design. Its development was carried out by the method of diagnosis of validated surveys and interviews, which were executed using a questionnaire developed on the basis of a previous research of Aguilar (2012). The interviews were applied to a stratified sample of a finite population of 108 coffee growers representing the cooperative. For the purposes of the investigation, the following procedure was applied: 1) Bibliographic information regarding the subject was collected; 2) The questionnaire was built on the basis of the thesis work "Socio-economic and environmental impact of organic certification-fair trade of coffee (Coffea Arabica) in the Frailesca Region, Chiapas, Mexico of Aguilar (2012) and in national and international instruments for the verification of organic production, proposed by the certifying bodies (producer's technical file and internal inspection sheet); 3) The questionnaire was applied to the cooperative members with a simple random sampling; and 4) Once the information was compiled, the database was constructed, the analysis of which was based on the use of the statistical program SPSS v.25 allowed to find parameters that evidenced the variation between conventional producers and organic producers and the relationship that existed in the variables of economic impact and organic production. To determine the economic impact generated by the organic certification of coffee, the cost/benefit method was used by which the indicators of the operationalization matrix were compared to establish the change or variation with respect to certification, then the correlation coefficient was determined to finally elaborate the matrix that allowed to determine the economic impact.

Results

In general, the coffee growers of the cooperative grow between 0, 50 and 7, 00 hectares of coffee per member. When analyzing the data obtained, there is that of the total, 28, 70% of the coffee growers manage 1ha/partner; 21, 30%, 2ha/partner; and 18, 50%, 3 ha/partner. In the analysis of the variable cultivation area, it was also shown that 50% of organic coffee producers manage only 1ha/partner, while 37, 04% of conventional producers have 2ha/partner.

The data in table 1, indicate that in 2018 the organic coffee producers on average managed 1, 60 ha/partner; which turned out to be less than the area managed by conventional producers that was 2, 70 ha/partner. Similarly, the average productivity per hectare of coffee for organic producers was 1045 kilograms and in the case of conventional producers it was 2468kg/ha. On the other hand, it can be seen that the organic producers had greater resilience in the face of lower prices since the average price per kilogram of parchment coffee was S/. 6, 60 which turned out to be higher than the average price obtained by conventional producers that was S/. 5, 90.Similarly, it can be seen that the maximum and minimum prices reached by both types of producers varied considerably. In fact, the maximum price of the kilogram of organic coffee was S/. 7,45and the minimum was S/. 5, 75. On the other hand, the maximum price per kilogram of parchment coffee for conventional producers was S/. 6, 83, and the minimum was S/. 4, 92.

Table 1.Economic parameters of coffee production in 2018

Producer	ha/partner	Yield/partner (kg)	Average Sale Price (S/./Kg)	Productivity(kg/ha)	Maximum price / Minimum price (S/./kg)
Organice	1,57	1 640,45	6,60	1 044,90	7,45 / 5,75
Convencional	2,68	6 613,75	5,90	2 467,80	6,83 / 4,92

Source: Own elaboratión.

Economic profitability was determined by analyzing production costs per hectare of both organic and conventional coffee. The data in table 2indicates that the total production cost of one hectare of organic coffee per harvest was S/. 5 874, 00, of which S/. 5 220, 00 corresponded to labor and S/. 120 to inputs. It is worth mentioning that according to the information in the database, the installation cost of one hectare of organic coffee amounts to the sum of S/. 6761, 70 and the data in table 3, indicate that the total production cost of one hectare of conventional coffee per harvest was S/. 13 322, 10 of which S/. 10 990, 00 corresponded to labor and S /. 1 121, 00 to inputs. Likewise, according to the information in the database, the cost of installing one hectare of conventional coffee amounts to the sum of S/. 7 001, 17. The differences are considerable, because the labor used in the case of organic coffee amounts to 80% of family labor and in the case of conventional coffee 100% is hired labor.

Table 2. Production costs of one hectare of organic coffee

	UNITY	NUMBER		
ACTIVITY	OF	OF	UNITARY VALUE	COST
	MEASURE	UNITS	(S/.)	(S/.)
DIRECT COSTS				
CULTURE EXPENSES:				
Labor:				
Fertilization				
Fertilization	wage	1	30,00	30,00
Cultural work				
Weeding (3)	wage	40	30,00	1 200,00
Pruning	wage	20	30,00	600,00
Phytosanitary Control				
Organic pesticides application	wage	5	30,00	150,00
Harvest				
Collection and hauling	wage	104	30,00	3 120,00
Pulped, fermented and dried	wage	2	30,00	60,00
Bagging and loading	wage	2	30,00	60,00
SUB-TOTAL LABOR		82		5 220,00
Supplies:				
Fertilizers				
Compost	kilogram	200	0,25	50,00
Organic pesticide				
Biol	liter	10	7	70,00
SUB-TOTAL SUPPLIES				120,00
GENERAL EXPENSES				
Unforeseen (10% culture expenses)				534,00
SUB-TOTAL GENERAL EXPENSES				534,00
COST OF PRODUCTION				5 874,00

Source: Own elaboratión.

Table 3. Production costs of one hectare of conventional coffee

ACTIVITY	UNITY OF MEASURE	NUMBER OF UNITS	UNITARY VALUE (S/.)	C0ST (S/.)
DIRECT COSTS				
CULTURE EXPENSES				
Labor:				
Fertilización				
Fertilización	wage	10	35,00	350,00
Cultural Works				
Weeding (3)	wage	30	35,00	1 050,00
Pruning	wage	10	35,00	350,00
Phytosanitary Control				
Pesticides application	wage	5	35,00	175,00
Harvest				
Collection and hauling	wage	247	35,00	8 645,00
Pulped, fermented and dried	wage	10	35,00	350,00
Bagging and loading	wage	2	35,00	70,00
SUB-TOTAL LABOR		82		10 990,00
Supplies:				
Fertilizers (120-70-120)				
Urea	kilogram	200	1,30	260,00
Di Ammonium Phosphate	kilogram	150	1,74	261,00
Potassium chloride	kilogram	200	1,40	280,00
Pesticides				
Benfuracarb	liter	1	115,00	115,00
Copper oxychloride	kilogram	4	45,00	180,00
Alky Sulfate	liter	1	25,00	25,00
SUB-TOTAL SUPPLIES				1 121,00
GENERAL EXPENSES				
Unforeseen (10% culture expenses)				1 211,1
SUB-TOTAL GENERAL EXPENSES				1 211,1
COST OF PRODUCTION				13 322,10

Source: Own elaboration.

After the economic analysis, we see that the profitability index for organic producers (table 3), reached 11,54% instead for conventional producers, this index only reached 3,84% (table 4).There is no doubt that sales prices make a difference in relation to returns.

Table 4. Economic analysis of organic production

VALUATION OF THE HARVEST	
Probable yield (kg/ha)	1 045,00
Average sale price (S/. /kg)	6,60
Gross value of production (S/.)	6 897,00
PRODUCTION DISTRIBUTION	
Losses and losses (5% production-S/.)	344,85
Production sold (95% production-S/.)	6 552,15
Estimated net income (S/.)	678,15
ECONOMIC ANALYSIS	
Gross value of production (S/.)	6 897,00
Total cost of production (S/.)	5 874,00
Gross profit of production (S/.)	1 023,00
Average unit sale price (S/.)	6,60
Unit cost of production (S/.)	5,62
Unit margin of utility (S/.)	0,98
Estimated net income (S/.)	678,15
Profitability Index (%)	11,54

Source: Own elaboration.

Table 5. Economic analysis of conventional production

VALUATION OF THE HARVEST	
Probable yield (kg/ha)	2 468,00
Average sale price (S/. /kg)	5,90
Gross value of production (S/.)	14 561,20
PRODUCTION DISTRIBUTION	
Losses and losses (5% production-S/.)	728,06
Production sold (95% production-S/.)	13 833,14
Estimated net income (S/.)	511,04
ECONOMIC ANALYSIS	
Gross value of production (S/.)	14 561,20
Gross value of production (S/.)	13 322,10
Gross profit of production (S/.)	1 239,10
Average unit sale price (S/.)	5,90
Unit cost of production (S/.)	5,40
Unit margin of utility (S/.)	0,50
Estimated net income (S/.)	511,04
Profitability Index (%)	3,84

Source: Own elaboration.

When analyzing the data in table 6, in the price, we found a high level of correlation (0,776; 0,781 and 0,729), figures that are closer to 1 than to 0; on the other hand, it is established that this represents a positive correlation, that is to say linear, so that the higher the percentage of associates, the higher the sales prices (average, higher and lower) obtained by organic coffee growers. The significance turns out

to be 0,000, that is, less than 0, 05 and 0, 01, which indicates that the correlation established was most likely true. In the area of cultivation, we found a low level of correlation (0,428), a figure that is much closer to 0 than to 1, establishing a positive correlation. This indicates that organic production had a positive economic impact.

Table 6. Correlation between the indicators of the variable income and type of production-2018

		Type of production	Average sale price	Highest selling price	Lowest selling price	Production	hectares of cultivation / partner
Type of production	Correlation coefficient	1,000	0,776**	0,781**	0,729**	0,693**	0,428**
	Sig. (bilateral)		0,000	0,000	0,000	0,000	0,000
	N	108	108	108	108	108	108

**. The correlation is significant at the 0, 01 level (bilateral). *. The correlation is significant at the level 0, 05 (bilateral).

Source: Own elaboration.

The data in table 6 shows that the economic impact generated by the organic certification was 96, 30%, resulting in an extremely significant impact, given that it is very close to the maximum rate of 100%.

Table 7. Economic impact of organic certification of coffee-2018

ECONOMIC IMPACT		
POINTS OBTAINED	X 100	96,3
POSSIBLE TOTAL POINTS		

POSITIVE	76 – 100
NEUTRAL	51 – 75
NEGATIVE	26 – 50

Source: Own elaboration.

Discusión

Certified producers show lower production costs and greater price resilience, which would allow them to have better margins of confrontation in the face of potential declines in international coffee prices. Indeed, the production costs per hectare of organic coffee are much lower than the production costs per hectare of conventional coffee (tables 2 and 3).This is because in the case of organic coffee, the cost of labor was assumed by 80% by the producer and his family and the cultivated area is also much lower than the conventional coffee cultivated area.

Córdova (2016), in a similar work carried out in the province of Los Ríos-Ecuador, concluded that the surcharges of certified coffee balanced low productivity to the extent that there were no significant differences in net income compared to conventional ones. In the case of our study, the unit profit margin of organic coffee was higher (S/. 0, 98) than that of conventional coffee (S/. 0, 5).This indicates that the organic certification of coffee is and will be a profitable option for cooperative

members to take into consideration.Net profits are reflected in the prices obtained by the partner coffee growers in 2018.In effect, the net profit for organic production reached S/. 678, 15, on the other hand for organic production this was S/. 511, 04.This indicates, then, that organic certification offers excellent possibilities for entering special coffee markets.

Conclusions

Based on the results obtained in the analysis of the economic impact of the organic certification of coffee (Coffea arabica) in the Agricultural Cooperative "Alta Montaña" of the Rodríguez de Mendoza province, it can be concluded that:

The organic certification has a positive impact of high significance in the economic indicators, with an impact index of 96, 30%, which turns out to be much higher than the minimum established to be positive ((76%).

The unit costs for the production of one kilogram of parchment coffee are relatively higher in organic producers (S/. 5, 62 /kg) than in conventional ones (S/. 5, 40/kg), which gives them a certain profit margin compared to the sales prices in the market.

The profitability of organic producers is much higher in organic producers (11, 54%) than in conventional ones, which becomes a good incentive to continue with organic certification.

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