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A Study on Costs of Production in Latin America

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INTRODUCTION

The majority of small-holder coffee farmers in the world do not know or even fully understand their costs of production. For decades, small-scale farmers have been price takers, accepting whatever price they get paid for the beans they produce.

From 1962 until 1989, the price of coffee was “subsidized” due to a quota system established in the International Coffee Agreement (ICA), which effectively put minimum prices on green coffee. The ICA established export volume quotas to producing countries that were member of the Agreement. In some years when there was overproduction, producing nations had to store in-country any excess supply of coffee in order to maintain a balance between supply and demand to protect those minimum prices. The minimum price established for Colombian UGQ coffee in 1989 prior to when the ICA ended was USD 1.20/lb; the Agreement ended in that year and so for the past thirty years most growers across the world have had to sell their coffee at the market price, usually tied to the ‘C-Market’. In the years since the end of the ICA quota system, market coffee prices have been quite volatile, with periods below what the industry believes are the costs of production.

But do we really know how much it costs to produce a pound or kilo of green coffee? Unfortunately, the answer is no. Although there have been numerous studies done on the subject, the reality is that it is quite complex to calculate costs of production at the farm-level due to three main factors:

- a) growers lack accurate records of their costs and inputs;
- b) the heterogenous nature of coffee farms – every farm is a different universe, with different yields and methods; and
- c) to date, most studies done on the subject omit some costs and/or have a very small sample base

As a company that has worked for almost two decades with small-holder farmers in Latin America, we have witnessed ‘C’ prices as low as USD 0.40/lb in 2002 and as high as USD 2.70/lb in 2011. When prices are low, most farmers neglect their farms, which means that production decreases, causing prices to rise in subsequent years. When prices are high, farmers mainly use the extra money to invest in their farms, causing production to rise, which subsequently causes oversupply and so eventually prices fall back again. It’s a never-ending cycle where those farmers that have higher costs of production can barely recuperate during the upcycles. Since coffee is a perennial, long-term crop, changing crops is not as easy as it would be for a corn or a rice producer. Therefore, it’s rare for coffee growers to completely abandon their farms or change business, perpetuating the problem.

Given this vicious cycle that most small-holder farmers are subject to, we believe that if coffee growers knew their costs of production, farmers would better understand their business and make informed decisions about what to do on their farms, including whether to continue growing coffee. For Caravela, it is also important to know the costs of production in each country where we source coffee as it provides us with an objective way to determine the FOB prices that we sell coffee and therefore guarantee a minimum level of profitability for our farmer partners.

WHAT IS COST OF PRODUCTION

The definition of cost of production is the costs incurred by a coffee farmer to produce coffee at the farm level (farm-gate), from the moment you prepare the soil for planting, until delivery of the dry parchment produced for sale to a buyer.

Since the majority of producers in Latin America that we work with deliver dry parchment at 10%-12% moisture, or in the case of Nicaragua, wet parchment at 45%-50% moisture (as opposed to East Africa where most growers deliver cherry to a washing station or wet mill), we calculate the costs up to the dry parchment stage. For Nicaragua, we include the costs that *beneficios secos* there charge for drying.

However, dry parchment needs to be processed to convert it to exportable green, which is the product that importers and roasters purchase. For the purpose of this analysis, we use a yield of 76% to convert dry parchment costs to green-equivalent and then convert the local currency cost into US Dollars. By doing this conversion, we can compare the farm-gate costs with the market price, which is expressed in either USD/lb or USD/kg.

It is important to mention that the farm-gate cost in green equivalent is not directly comparable with the market price ('C' Market), as the latter is always quoted on an FOB-basis, which includes, amongst others, the following additional costs which are normally the responsibility of the exporter at origin:

- Dry milling
- Packaging costs
- Logistics costs
- Export taxes
- Export margin

These extra costs vary greatly from country to country.

INFLUENCING FACTORS

There are multiple factors that influence costs of production, such as: inflation, taxes and tariffs, supply chain efficiency, transportation costs, productivity and yields at the farms, and exchange rates. For example, in Peru input costs are higher than in other countries because of the transportation costs of inputs such as fertilizers. In Nicaragua and Ecuador, for example, input costs have risen dramatically over the past two years due to substantial increases in VAT and duty.

There are two types of costs on coffee farms (and, for that matter, in any business): fixed and variable.

The first are costs that are incurred independent of the amount of coffee produced, such as administration or equipment costs, and thus must be divided in the total number of kilos produced. Hence, the higher the productivity of the farm, the lower the fixed costs per unit produced. The higher the proportion of fixed costs, the higher the productivity of the farm must be in order to pay for them.

Variable costs depend on the amount of coffee produced. For example, harvesting costs are variable because if you produce more cherry you need more pickers, as there is a limit to the amount of cherry a person can pick in a day.

Table 1 - Fixed and Variable Costs

Variable	Fixed
Harvesting	Administration
Other manual labor	Equipment (depreciation)
Transport	Land
Financing	Inputs
Utilities (energy & water)	Plant establishment
	Renovation

COUNTRIES INCLUDED

The following figure shows the countries where we have calculated costs of production. These seven countries are where Caravela directly sources coffee from coffee growers and where we have on-the-ground education teams, which allows us to have more accurate information of the market costs of inputs and labor.

Figure 1 - Countries Covered in this Study



THE METHODOLOGY

We developed a financial model in Excel where we incorporated all costs incurred by a coffee grower in every country subject of this study. The only costs not included in the calculations were financing and land costs, as these depend on many factors and are therefore difficult to model.

In order to properly model the costs, we made the following assumptions:

- All farms have a standardized technology and farm-management practices, with the same tree density (5,000 trees/ha) and average yields (30 bags per ha). This is high, but achievable, productivity level if farmers apply good agronomic practices such as fertilization based on soil analysis and constant renovation of aging trees
- Farm size is 3.0 hectares for all countries
- Since the farm size is small, we have included in administration costs one monthly legal minimum wage for the farmer, as established in each country, including any obligatory health insurance and pension contributions
- Costs for labor and inputs are the market costs in each market, as surveyed by our PECA team
- 15% of the total trees are renovated every year by pruning/stumping, therefore the manual costs of pruning/stumping are included.

Table 2 - Selected Assumptions

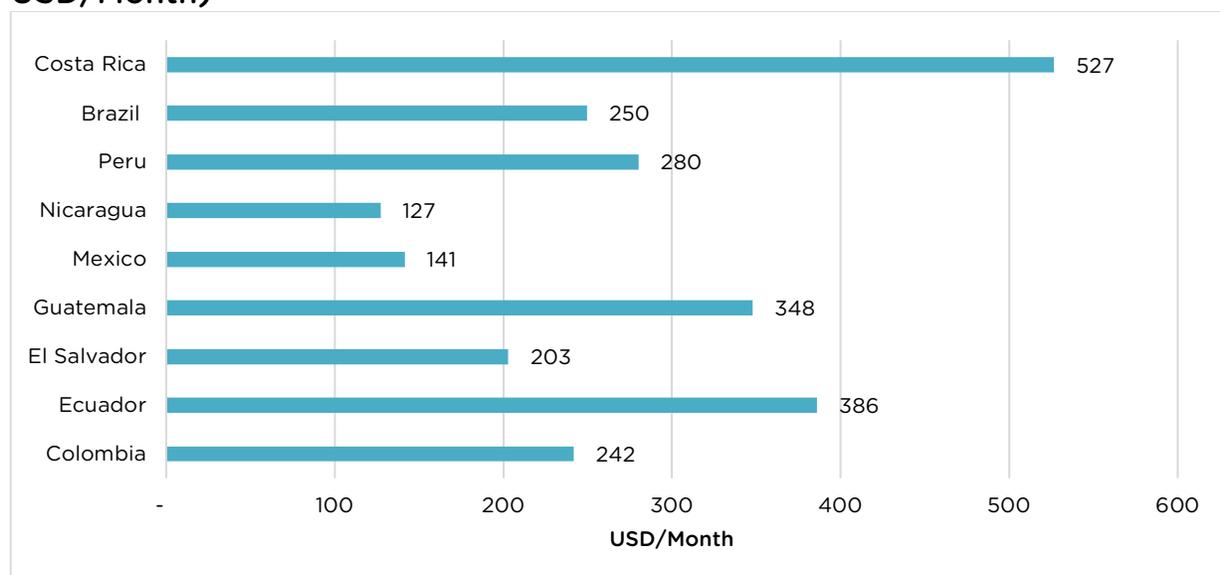
	Colombia	Ecuador	El Salvador	Guatemala	Mexico	Nicaragua	Peru
Exchange Rate (Local currency/USD)	3,200	1.00 ⁽¹⁾	1.00 ⁽¹⁾	7.60	19.00	32.90	3.30
Daily minimum wage (USD/day)	9.38	17.00	8.00	6.58	5.26	5.45	10.54
Harvesting (USD/kg)	0.139	0.280	0.130	0.145	0.105	0.112	0.154

(1) Dollarized economies, hence, exchange rate is equal to 1.00

COSTS

Individual costs in US Dollars can vary greatly between countries due to several factors, such as exchange rates and taxes (e.g., VAT rates, duties). As coffee in the seven countries included in this study is manually and selectively harvested, it is vital to compare the minimum wages in these countries to observe the differences in what is the major input in coffee farming. Figure 2 below shows the minimum wage in the seven countries, plus Brazil and Costa Rica for comparison purposes.

Figure 2 - Legal Minimum Wage in Selected Latin American Counties (in USD/Month)

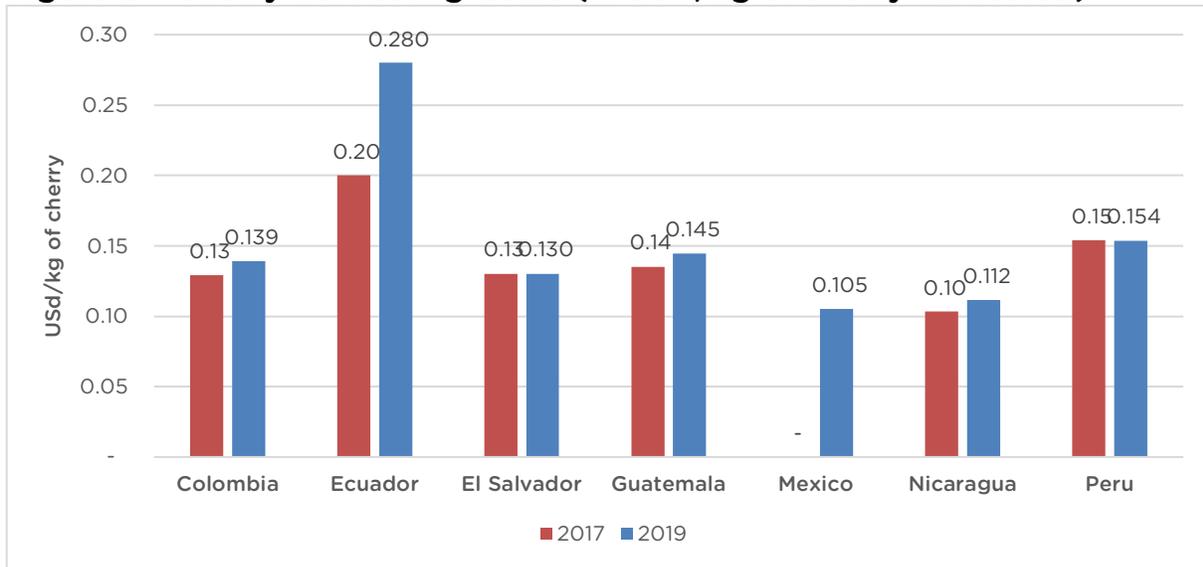


As seen above, Nicaragua has the lowest minimum wage, followed closely by Mexico, with Ecuador the highest and Guatemala second. Minimum wage in Colombia lies in between.

Harvesting (picking) costs are a substantial percentage of overall costs at a farm and one of the most significant cash requirements of farmers during harvest time. Figure 3 below shows the costs of harvesting a kg of cherry in

2017 and 2019. In most countries, excluding El Salvador, harvesting costs have increased over the last two years as a result of lower labor availability and inflation. Ecuador is a clear example with an increase of 40% in harvesting costs, due primarily to a very tight labor market. It is interesting to observe that in Guatemala, despite having a high minimum wage relative to most other countries, harvesting costs there are not much higher than the rest, which is most likely due to higher supply versus demand of manual labor.

Figure 3 - Cherry Harvesting Costs (in USD/kg of cherry harvested)

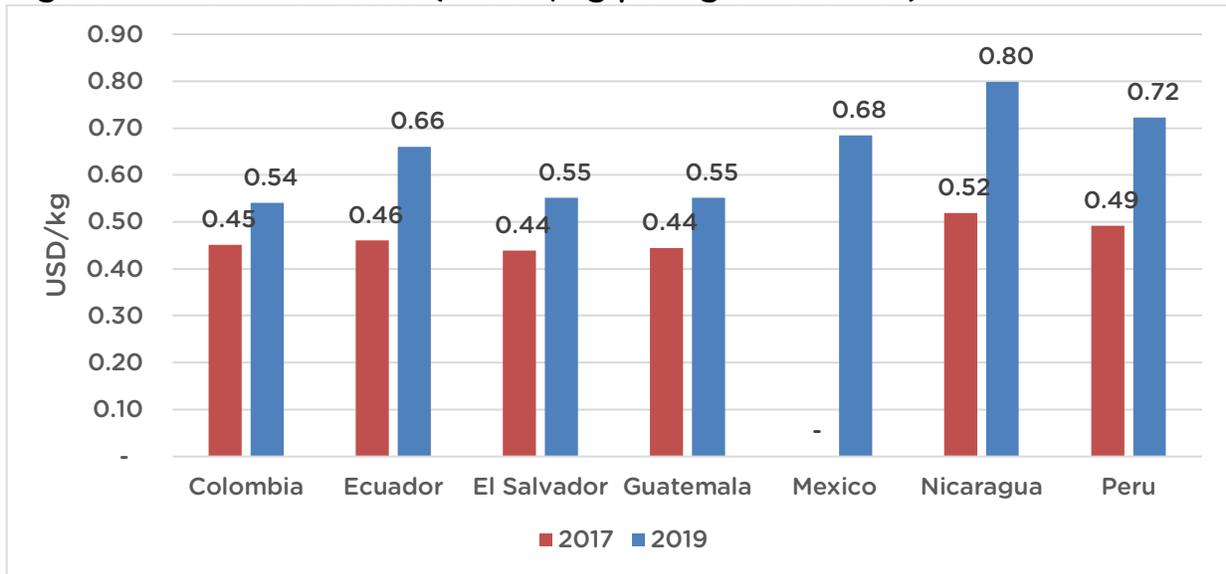


Fertilizers are the most important input that coffee farmers use on their farms. To obtain a yield of 30 bags per hectare, it is necessary to apply fertilizer based on soil analysis so that trees receive the nutrients needed to produce to their maximum potential. In order to properly compare costs between the different countries, we have taken the market cost of Yara’s Hydran 19-4-19 fertilizer, which is the only brand and formula available in all the seven countries. Additionally, it is a formula that is very effective as it was specifically developed by Yara for coffee.

Surprisingly, fertilizer costs have increased by between 20% in Colombia and 54% in Nicaragua. This is a significant increase which is primarily related to the rise in oil prices observed in these two years. But the cases of Nicaragua and Ecuador, where costs have increased by almost 50%, is related to higher import duties and VAT on fertilizers, plus tougher restrictions on the import of goods.

Figure 4 below shows the costs of a kilogram of fertilizer in each of the seven countries.

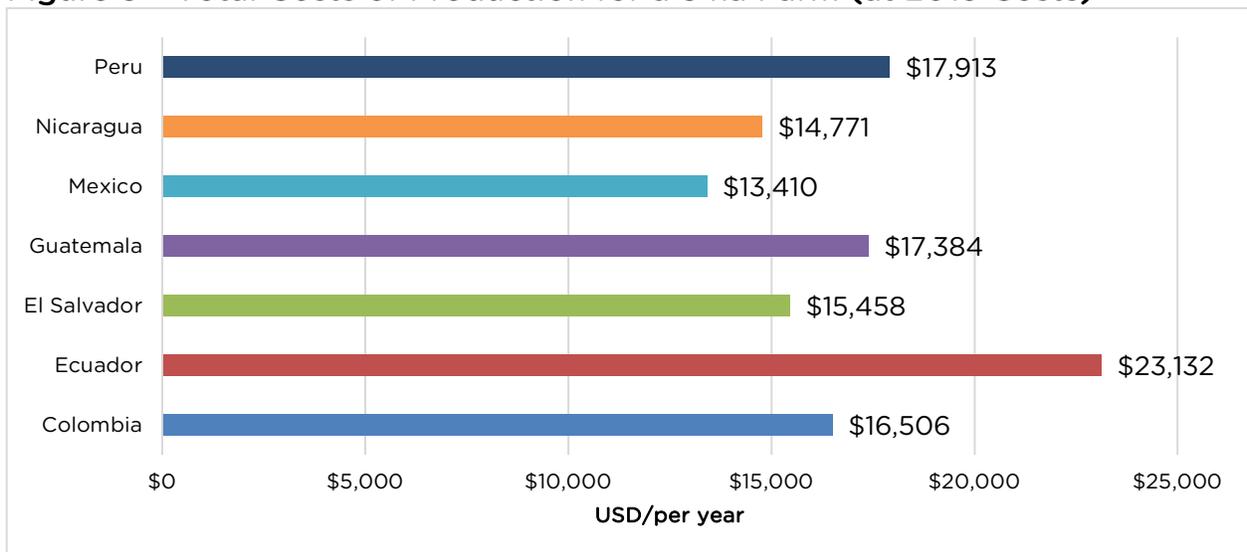
Figure 4 - Fertilizer Costs (in USD/kg per kg of fertilizer)



RESULTS

Figure 5 below shows the total yearly costs of production for a 3-hectare farm according to our cost of production model in each of the seven countries studied.

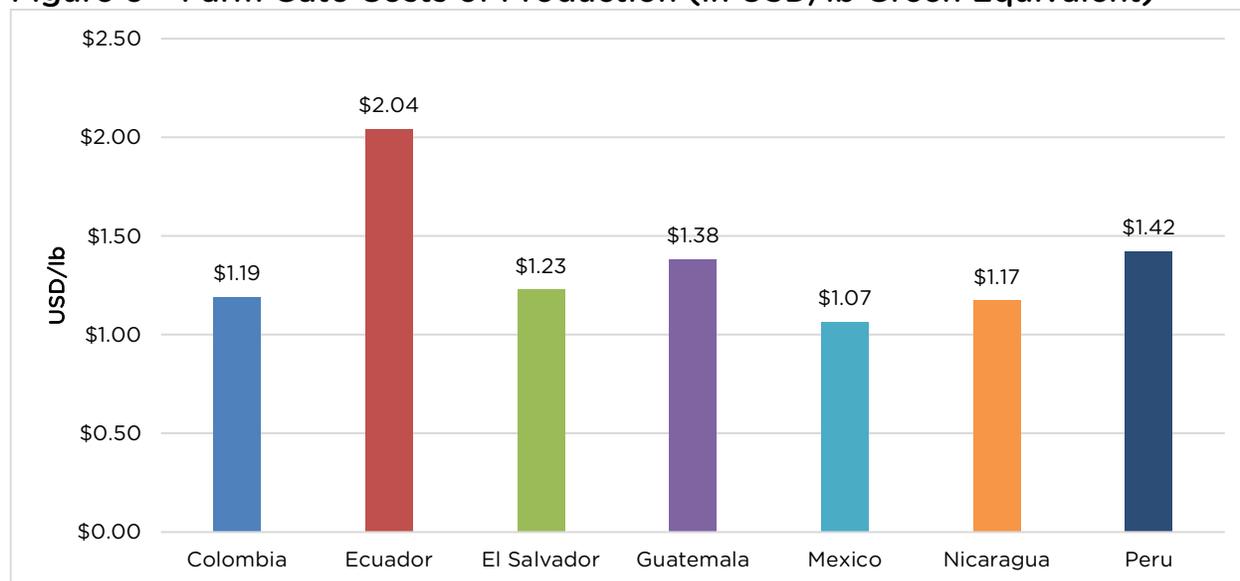
Figure 5 - Total Costs of Production for a 3 ha Farm (at 2019 Costs)



The most expensive country is Ecuador, with a total cost of \$23,132 dollars, while Mexico is the least expensive, with a total cost of \$13,410 dollars.

Figure 6 shows the total costs of production in USD/lb green equivalent. To reach the green equivalent, we have assumed a green-to-parchment yield of 76%. It is worth noting that this unit cost is expressed at the farm-gate level, so it is not comparable to the ‘C’ price, as the latter is expressed on an FOB basis. To calculate the cost of production at an FOB basis, it is necessary to add other additional expenses such as dry milling, logistics and export related costs, export taxes (where applicable) and the exporter’s margin. These extra costs vary from country to country between 15 and 25 cents per lb.

Figure 6 - Farm Gate Costs of Production (in USD/lb Green Equivalent)

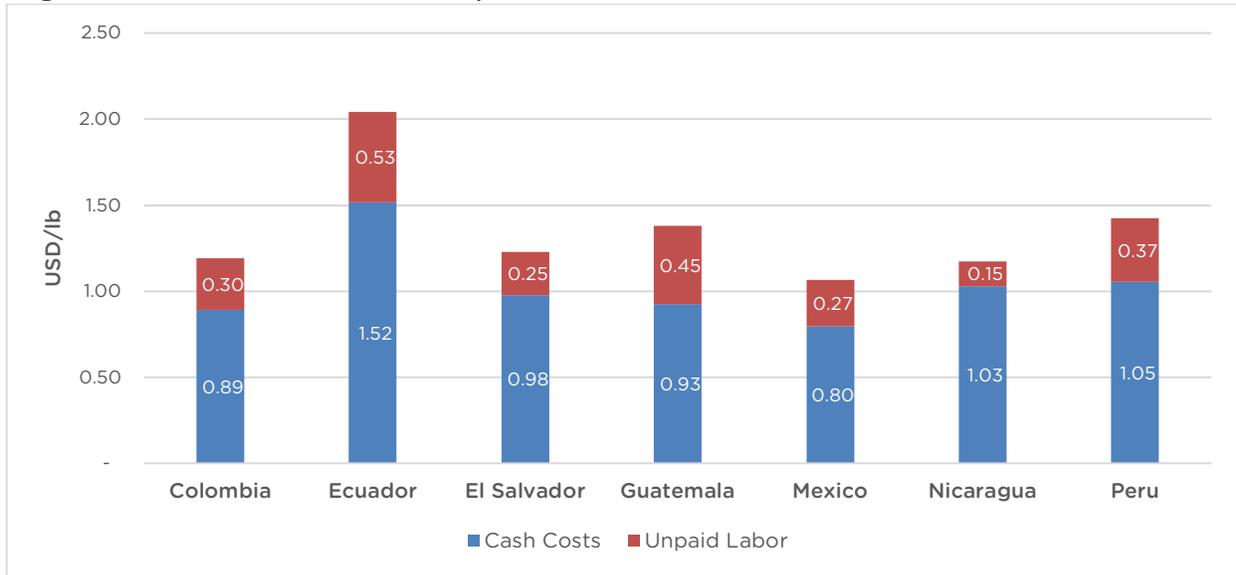


Given the numbers above, at current market prices of around \$1.00/lb¹, and including current market differentials for each country – which add between 10 and 35 cents per lb to the ‘C’ price depending on the origin – even the most efficient coffee farmers in these seven countries are currently selling coffee below their costs of production.

Considering that our model includes a minimum wage for the farmer, which is an unpaid labor cost (i.e., not a cash payment), figure 7 below separates the cash costs and the unpaid labor costs. This allows us to see a coffee farmer’s actual cash expenditure and therefore the minimum cash they would have to receive to at least pay for the inputs and labor necessary.

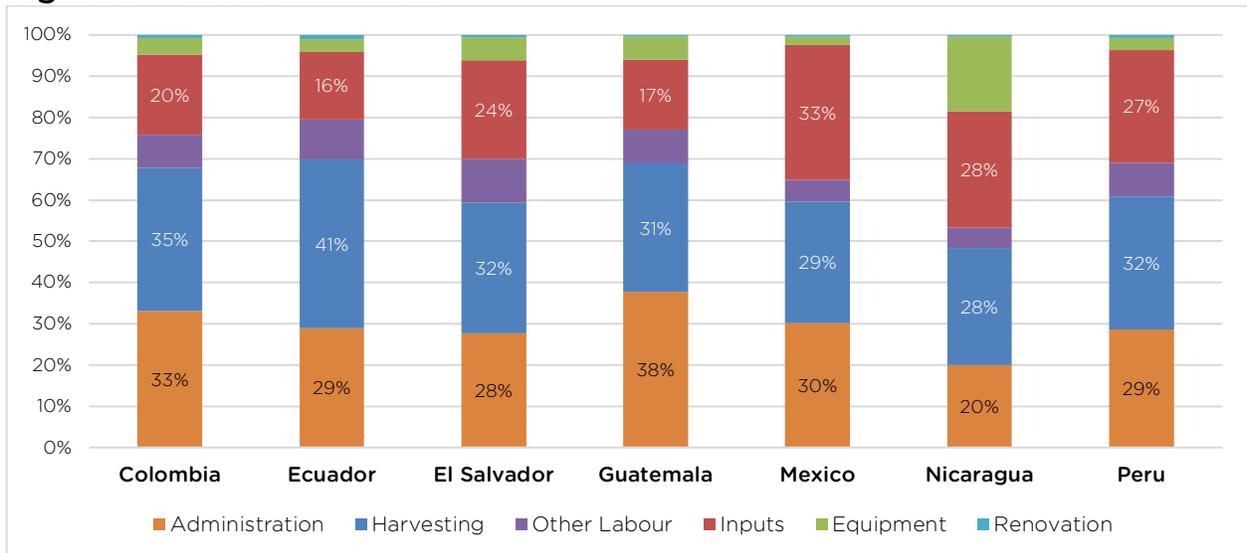
¹ As of 15 July 2019.

Figure 7 - Cash Costs and Unpaid Labor



Administration costs, the majority of which correspond to the minimum salary for the farmer, account for between 20% and 38%. However, as previously noted, this is not a cash expenditure for small farmers. Harvesting costs are the second most important expenditure, and the biggest cash cost that a farmer has to bear. These two categories represent between 60% and 70% of total costs. Inputs, such as fertilizers, come third. As seen in Figure 8 below, renovation is a minor cost percentage, despite being a crucial activity as doing it annually to around 15% of the total number of trees planted permits farmers to have a more constant yield instead of wild swing in output as coffee trees become unproductive as they age.

Figure 8 - Costs Structures

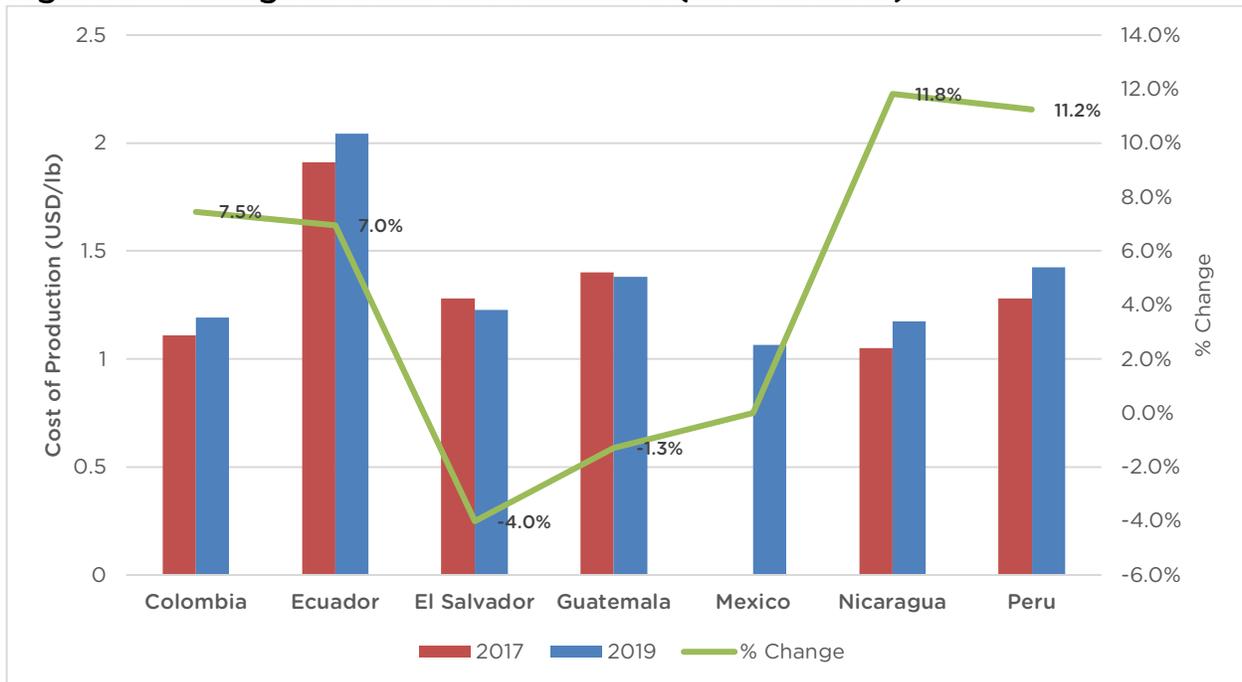


HOW COSTS OF PRODUCTION HAVE CHANGED SINCE 2017

In 2017 we performed the same exercise in all countries except for Mexico. Figure 9 below shows the costs of production calculated in 2017 vs those calculated in 2019.

As seen in Figure 9 below, with the exception of Guatemala and El Salvador, the other countries in this study had increases in their cost of production, with costs in Nicaragua growing 11.8% in the course of these 2 years, the most of the 7 countries analyzed.

Figure 9 - Change in Costs of Production (2019 vs 2017)



Note: There is no data for Mexico in 2017 as we did not calculate those costs that year.

The main reason why production costs have risen in most countries is, as observed in Figures 3 and 4, related to substantial increases in fertilizer and harvesting costs. As labor and fertilization costs correspond to over 60% of total costs, any increases in these two areas easily translate into higher overall costs.

CONCLUSIONS

As seen in this study, costs of production have increased in the last two years in the seven countries analyzed, during a period when market prices have fallen to their lowest level in over 14 years. This is due to two main reasons:

- Continued increases in labor costs above inflation, as labor markets tighten across origins due to migration and more lucrative opportunities elsewhere for unskilled workers
- A significant increase in fertilizer costs, a consequence of rising oil prices, and in some countries due to higher import tariffs, taxes and import restrictions

At current market prices (for commercial grade coffee), and with the costs of production observed in this study, small-holder coffee farming is not a profitable business. And as highlighted in this analysis, even farmers with higher-than-average yields and planted areas well above the average, at today's market prices are losing money. Growers with inferior planted areas and lower yields would certainly have higher unit costs than those calculated in this study, as administration costs would have a greater weight in the overall cost structure and yields would be significantly lower.

Therefore, higher prices alone are not sufficient to help farmers achieve sustainable incomes; growers must also work to increase their farm size and productivity. Since small farmers lack easy access to finance for training, fertilizer, and technology investment, it is urgent that the industry and other supporting entities focus on providing better access to finance and education/technical assistance.

Facilitating access to market for smallholder producers, preferably developing long-term relationships with coffee roasters and/or traders who are willing to sign multi-year contracts with fixed prices well above costs of production, would significantly contribute to income certainty and stability for small farmers, facilitating the re-investment and savings that would provide resilience against market slides, and encourage land purchases so that they can increase their scale.

Finally, it is important to educate coffee farmers on how to properly calculate their costs of production and encourage them to calculate them at least every couple of years so that they can better understand where they stand against the numbers shown in this study and focus on closing the gaps.

ACKNOWLEDGMENTS

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