

How to Cite:

Cevallos, C. E. S., Rodríguez, I. D. J., & Santana, L. del C. G. (2021). Financial evaluation of annatto paste production from ancestral knowledge in Manta Blanca. *International Journal of Economic Perspectives*, 15(1), 38–48. Retrieved from <https://ijeponline.org/index.php/journal/article/view/8>

Financial Evaluation of Annatto Paste Production from Ancestral Knowledge in Manta Blanca

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Abstract--The study consists of a financial evaluation to determine the feasibility of the production of annatto paste from ancestral knowledge in Manta Blanca of the canton of May 24. Experimental field research was applied as a methodology, through the application of an open interview to a peasant woman from said town, knowledgeable about ancestral knowledge, with the aim of rescuing traditional knowledge and consequently producing traditional coffee, which served to drink data and consequently to be able to determine the feasibility of the production of the ancestral annatto paste; Tools such as financial analysis and financial evaluation methods of net present value, benefit-cost ratio and internal rate of return were used. The results were the description of the annatto paste production process, the financial analysis and the financial evaluation of the annatto paste production yielded a NPV of 718.05, a B / C ratio of 1.07 and an IRR of 28. 25%. According to the indicators obtained, it could be concluded that the recovery of ancestral knowledge for the production of traditional achiote paste is feasible to be implemented.

Keywords---analysis, benefit, feasibility, knowledge, process.

Introduction

Achiote, whose scientific name is Bixa Orellana, in honor of the conqueror Francisco de Orellana, is a natural coloring and condiment, originally from the

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Submitted: 18 April 2021, Revised: 27 May 2021, Accepted: 9 June 2021

tropical zone of America. It comes from the tree whose name is the same, from its fruit seeds are extracted that give rise to the spice, currently being cultivated in other regions of the world such as Asia and Africa. Its use has been recorded since pre-Hispanic times, for example, according to Spanish chronicles, it was common among the Mayans to prepare it together with cocoa. Currently its use is very widespread, not only for food purposes but also for its medicinal properties and multiple cosmetic applications.

Achiote provokes an internal fascination produced by its intense color, it arises from the mystical attraction that exists around the plant and from the multiple traditions that have been established around it, based on different knowledge such as the concern that the ancestral memory tends to disappear, especially due to the influence of globalization, without taking into account the cultural burden and the importance of this crop for the environment, the gastronomic, political and traditional sphere that is at risk of being irreversibly lost for the new generations about the knowledge of this spice and its many uses (Salguero, 2017). It is used in different ways such as in the ceramic industry to produce varnishes, paints and lacquers Pineda & Calderón (2012), it is also used in the dyeing or coloring of silk and cotton fabrics due to its antioxidant properties, in It is currently used in the cosmetics industry and products dedicated to body care, such as creams, lotions, shampoos, etc. Achiote oil is emollient and has a high content of carotenoids and pro-vitamin A activity, which confers medicinal properties to these products.

The main component of the various products made from annatto is the colorant extracted from its seeds, which can be used as a condiment in food to give color and flavor to food in general, in addition to being used as a colorant, it is also used for The preparation of typical dishes as in indigenous rituals due to its benefits, is one of the medicinal plants most popular in the Amazon region that contains a large amount of nutrients that positively act on the human organism (Baires et al., 2005). Currently, the trend of new markets is based on natural products that are friendly to the environment, produced in a traditional way, since consumers have become more demanding when purchasing their products (Scarpeta & Sánchez, 2019).

The annatto seed contains vitamin A (retinol) and carotenoids: l-carotene, bixin, methylbixin, transbixin, norbixin, cryptoxanthin, lutein and zeaxanthin. Its leaves contain alkaloids, flavonoids and the Ishwaran sesquiterpene. Norbixin, a water-soluble dicarboxylic carotenoid, is present as a component of the pericarp in Bixa seeds. The most important carotenoids in these seeds, bixin and norbixin, which form a strong dye known as annatto, used in the food industry, have antioxidant properties and antitumor activity (Dávila, 2021). Ecuador has an excellent climate for the cultivation of annatto in rural communities on the Ecuadorian coast and the Amazon region, where it is produced in large quantities. In Santo Domingo de los Tsáchilas, it is one of the provinces that produces the most achiote, where much of it is destined for the national market and another for export in four presentations such as powder, paste, liquid extract and seed, these products are extracted mainly from the dye of the pulp that is inside the fruits (Molina, 2017).

The national production of achiote has promoted quality production in commerce, consumption of goods and services, with social and environmental responsibility. Achiote represents a cultural and ancestral component based on the traditional recipes of its production in various products, gradually making its way into a market dominated by similar imported products (Andrade, 2017). In the province of Manabí there are about 420 hectares of achiote crops, of which approximately 200 hectares are old and productive and the rest are cultivated and in the production process that has been gaining relevance during the winter stage, where week by week it distributes to two large factories in the port of Manta with a production between 200 and 250 qq of achiote, where it is projected to produce and sell between 400 and 500 quintals, which is approximately 2000 qq per month (El Diario, 2017).

On a national scale, achiote crops on the rural Ecuadorian coast tend to decrease, because there are few farmers who are dedicated to the sowing of achiote, as it is a long-cycle crop, and a year must be waited to be able to harvest a single crop. The time that farmers prefer to ignore and replace them with short-cycle crops that give them more frequent income, coupled with the difficulty of harvesting at least 20 pounds of grain and then obtaining after a long process a pound of achiote paste (La Hora, 2016). It is important to look back at ancestral knowledge (Castro & Zambrano, 2020) and recover part of the ancestral wisdom of the production of traditional products of our Montuvian land in this way, the objective of this study is to carry out a financial evaluation of the production of achiote paste, based on ancestral knowledge in a rural community in the province of Manabí, to determine its feasibility as a small business (Laslett et al., 1987; McInerney & Terzopoulos, 1996).

Materials and Method

Location

The study was located in the canton May 24, Manta Blanca commune, geographically located in the coordinates $1^{\circ} 03'08''$ S $80^{\circ} 27'02''$ W specified in figure 1.



Figure 1. Location of the May 24 canton, Manta Blanca commune
Source: Municipal GAD of the May 24 Canton

Method

To carry out the market study, the supply was determined, and data was collected from the main stores and supermarkets with respect to pasta brands of achiote in terms of content, sale price and brand (Hatch & LEES, 1968; Wold et al., 1987; Chambers et al., 1996). The least squares method was applied for the projection of demand, the formula of which is described in 1.

$$Y_m = a + bx \quad (1)$$

For this it is necessary to identify the values of the constant (a) and the variable (b).

$$a = (\sum y) / n \quad (2)$$

$$b = (\sum xy) / (\sum x^2) \quad (3)$$

For the recovery of ancestral knowledge, a native woman of Manta Blanca was interviewed about the knowledge of the preparation of annatto paste in an ancestral way, with which was carried out the flowchart of the annatto paste production process using the symbols of the (ILO) International Labor Organization (Wang et al., 2003; Studer et al., 1998; Spelke, 1994). With the information obtained from the market research, operations were carried out in Excel to determine their feasibility such as the net present value (VAN), internal rate of return (IRR) and benefit-cost ratio (B / C) whose formulas are:

$$VAN = \text{Benefits} - \text{costs} \quad (4)$$

$$BC = B / C \quad (5)$$

$$TIR = TM + ((TM - T_m) * NPV T_m) / ((VANM - VANm)) \quad (6)$$

Results and Discussion

According to the objectives of the work, the Coffee in a 50gr sleeve is sold in the 3 commercial stores of the May 24 canton and the result of the achiote paste offer in the May 24 canton is shown in table 2.

Table 2
Achiote paste supply on May 24

Brand	Trade/ Store	Content (g)	Price (\$)
Achiote paste	Tía,		0.75
	Vespinsa foods	500	0.73
	Rosvil		0.78
Achiote la Favorita	Tía,		0.80
	Vespinsa foods	700	0.79
	Rosvil		0.76
Achiote Oil ILE	Tía,		0.85
	Vespinsa foods	500	0.78
	Rosvil		0.79

Source: (Soledispa, Jiménez & Galarza, 2021)

The highest consumption of paste achieve in the historical series studied was in 2020. The results of the demand for coffee in the canton May 24, can be seen in the table 3.

Table 3
Demand for annatto paste

Years	Consumption (achieve paste)
2016	2300
2017	2400
2018	2500
2019	2600
2020	2700

Source: Central Bank of Ecuador

According to the data obtained in this research, the calculations were carried out in such a way that the calculation of least squares was implemented, where the projection of this year obtained an amount of 9,181.96 and it is expected that for next year under the great health problem, it will increase to 10,290.74 which can be seen in the figure 2.

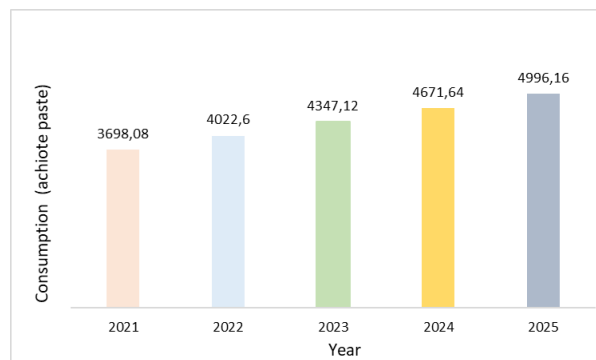


Figure 2. Projection of demand for annatto paste

Source: [Soledispa et al \(2021\)](#)

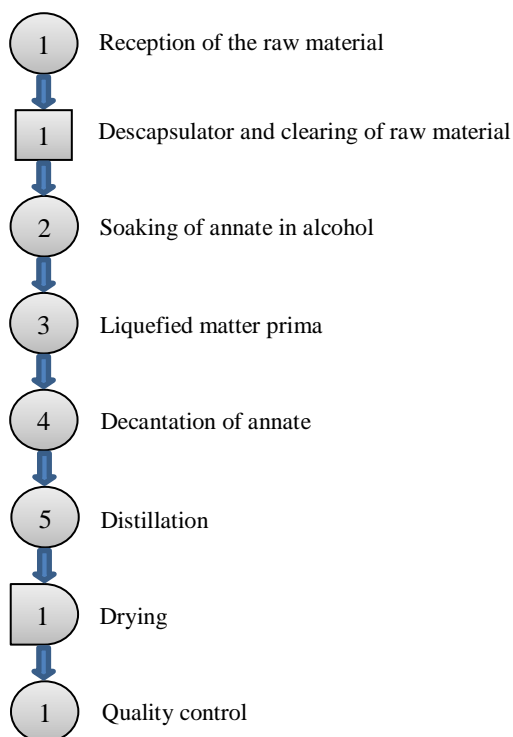
Description of the annatto paste production process

In our Manabí countryside there are many inhabitants who are in charge of producing different types of products that bring many benefits; At present, ancestral knowledge has already been forgotten but in this present project we are going to carry out an ancestral rescue, which has been going back since past times, achiote has several functions that in some of the cultures of the past was used to flavor the different foods and to alleviate symptoms of illness ([Mulyani et al., 2017](#); [Sudiartini et al., 2020](#)). To rescue the knowledge of the production of traditional achiote pasta, an interview was conducted with Mrs. Ramona Cevallos Baque, who revealed the details of the preparation of the pasta, from the teaching of her ancestors. For the elaboration of the annatto paste, different implements were used such as clay pots of different sizes, the mill, the wood oven, dry

annatto, and water, seasonings such as garlic, oregano, cumin, spices, salt, hot pepper and butter.

The first step for the elaboration of the traditional annatto paste is the raw material using the dried annatto and peeled manually, since it is not necessary to use machinery to remove the seed from its shell, because the seed would be damaged, then little by little. Little is obtained from the achiote seed which must be peeled according to the amount needed to produce a certain amount of pasta. The achiote seeds are peeled and soaked in a large clay pot with water, for a time of 24 hours in which the seed has absorbed enough water to be able to carry out the grinding, using a graduated mill so that the resulting mass resembles to a stew, once the whole amount of achiote has been ground, it is sifted in a sieve, the sifted mass must have a thick texture.

The liquid strained from the achiote is brought to cooking and placed in a clay pot in the wood oven to be cooked, then you must wait two hours to add the seasonings and season the pasta, the seasonings are liquefied. separately, once the seasonings are blended, the previously boiled achiote is added, starting from the cumin, once introduced to the pot we wait a few minutes to add the oregano, garlic, salt, hot pepper, and lard, having to wait about 2 hours. Once the achiote has been boiled, the cooking will present a thick texture, little by little. It is allowed to cool for a couple of hours to have a pasty and cold texture, it is placed in a container to put it in the fridge to maintain the pastiness and flavor. This resulting product is used in different edible preparations such as refried, soups, baked pork, among others, observe in the figure 3.



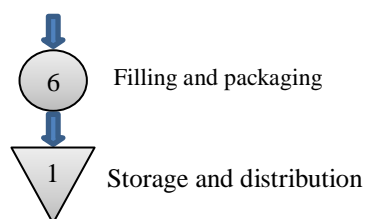


Figure 3. Flowchart of the annatto paste production process
Source: [Soledispa et al \(2021\)](#)

Financial analysis

For the production of annatto paste, it is incurred to determine the total investments, which is understood as fixed investments and operating capital as it can be view in table 4.

Table 4
Investments

Investments	Total value (\$)	%
Fixed investment	2,234.10	29.86
Capital Operating	5,247.58	70.14
Total	7,481.68	100.00

Source: [Soledispa et al \(2021\)](#)

Regarding the following table 5, we proceed to break down the fixed investments according to the total costs referring to the items of machinery and equipment among other assets or unforeseen.

Table 5
Fixed investment

Investments	Total value	%
Machinery and equipment	1,911.00	85.54
Other assets	120.00	5.37
Contingencies (10%)	203.00	9.09
Total	2,234.10	100.00

Source: [Soledispa et al \(2021\)](#)

Operating capital is that economic value for carrying out current activities in the business, so it includes production costs, administrative and general expenses, and sales expenses and promotion, according to the following table 6.

Table 6
Capital operation

Denomination	Time (months)	Monthly value	Total value
Production costs	3	2,077.53	6,232.58
Administrative and general	3	0.00	-1,000.00

Expenses sales and promotion expenses	3	5.00	15, 00
Total			5,247.58

Source: [Soledispa et al \(2021\)](#)

The capital operation is shown in detail in Table 7.

Table 7
Capital

Description	Unit (g)	Quantity	Unit (\$)	Price	Total
annatto paste	covers 100 g	2909	0.80		2327.27
Total					2327.27

Source: [Soledispa et al \(2021\)](#)

Estimated sales are shown in detail in table 8.

Table 8
Estimated sales

Description	Value
sales revenue	2,333.27
total expenses	1,582.53
net income	750.75

Source: [Soledispa et al \(2021\)](#)

Financial evaluation

The results of the application of the three financial evaluation methods are the net present value (VAN), benefit-cost ratio (B / C) and internal rate of return (TIR) observed in table 9.

Table 9
Financial evaluation by VAN, B / C and TIR

Description	Value
NPV	\$ 718.05
B / C	1.07
IRR	28.21%

Source: [Soledispa et al \(2021\)](#)

According to the data obtained in the financial analysis The following obtained valuations are presented, which consists of a net present value (NPV) of 718.05, which is why it presents a benefit - cost (B / C) of 1.07 in terms of the internal rate of return (IRR) it was 28.21%.

In their study to determine the feasibility of a company producing achieve paste, a positive net present value was obtained, which means that the company will have an increase of USD \$ 28,321.74, the rate Internal return was calculated at 16.60%, a rate higher than the cost of capital which is 10% and the company supports an increase in costs up to 3.47% and a decrease in its income up to 2.20%, in Based on such financial evaluation criteria, the feasibility of project execution is determined. In the present work of a small artisan-scale annatto paste production business, the feasibility of annatto paste production was determined, by means of a positive VAN, a B / C ratio greater than 1 and a TIR greater than 20% of the market opportunity rate.

Conclusion

By virtue of the results of this work, the viability of production of achiote paste can be evidenced both at the business level, entrepreneurship level, small investment, business, based on the recovery of ancestral knowledge of pasta production of achiote.

Acknowledgments

Our gratitude goes to the Supreme Being who has comforted our ways, our parents and siblings who are our motivation and strength.

To Mrs. Ramona Cevallos, a native of the Manta Blanca sector, canton 24 de mayo, province of Manabí, who knows the ancestral practices of producing achiote paste, thank you for your guidance and patience during the research on the preparation of achiote paste, to make it known in the academic - scientific community.

We thank Ing. Luz Del Carmen Galarza Santana, our tutor in the work of recovering the ancestral knowledge of achiote paste, who with her wisdom, patience, kindness and kindness has been able to guide and lead us in the development of this research from the previous participation in the contest creates wits.

To the Lic. Carmen Liliana Mera Plaza, our first career coordinator, a very special thanks to those who with their charisma, generosity, nobility, support and motivation have managed to guide us and encourage us on this path of research and trust us to generate knowledge that can be disseminated in the academic community.

To Eng. Telly Yarita Macías Zambrano, our professor of design and project evaluation, creator of the competition for the recognition of the knowledge, creativity and innovation CREA INGENIOS, at the Paulo Emilio Macías Higher Technological Institute, who had been encouraging us in classes for research until we decide to enter the contest with your valuable presence. To her, our sincere affection for her teachings and kindness, with which she knew how to reach us.

Thanks to the editorial group of the Journal for considering this research work for its publication and dissemination of an ancestral knowledge of our Montuvio people to which we belong.

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