FEASIBILITY STUDY FOR THE IMPLEMENTATION AND DEFINITION OF COMMERCIALIZATION CHANNELS: RED TILAPIA IN THE SUCUA CANTON PROVINCE OF MORONA SANTIAGO.

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SUMMARY

The work is a feasibility study for the production of red tilapia in the Sucua canton of the province of Morona Santiago, the production and commercialization of 9,900.00 kg of tilapia meat during 3 years of the project's life is considered as the size of the project. ; Additionally, an overview of the state of this productive system is given, the history of how it was introduced in the country, later objectives are defined, the same ones that are strategically aligned to respond to the problem statement. Certain principles on management, its productive behavior, marketing processes, and on the different components that make up a feasibility study are enunciated, considering the criteria of different authors. Subsequently, the methodology and strategies used are addressed, the same one that starts from a qualitative and quantitative approach, the different phases and moments necessary for the construction of the information required in the structuring of the present study are described, finally the results and It begins with the determination of the initial investment ($11,657.40), the following process analyzed the operating costs ($32,678.60), financing

KEYWORD:*-Tilapia, Feasibility, operation costs, internal rate of return, channels, commercialization*

1. INTRODUCTION.

Aquaculture plays a fundamental role within the strategies proposed worldwide as a productive activity aimed not only at generating resources, as a dynamic source of the rural economy, but also as an alternative to safeguard food security in several regions of the world.(FAO , 2014)

According to this criterion, aquaculture has grown significantly, according to data from the , fish production in the world meant in 2012, 90 million tons of which 24 million came from artificial farming systems, observing an increase of 85% (136 million tons) if we compare with the (FAO ,

2014) production reached in the 80s of the last century. That means capture fisheries did not grow in the face of fish production in artificial systems.

Fish production in artificial estuaries grows significantly, and is defined as: rearing under intensive management systems that guarantee the contribution of optimal environmental conditions, as well as the permanent supply of high quality food that contributes to productive strengthening and generates financial sustainability (Montes, et al 2017).

In the Ecuador the growth of aquaculture production has not been alien to the development that this activity experiences worldwide, noting that after the production of shrimp and salmonid species, tilapia is the one that continues to grow, including its production is sufficient to cover the national demand for this product (Lopez, 2015) .

Theproduction of tilapia occurs in warm climates especially in the Ecuadorian coast and Amazon, activity that had more force from 1999 due to the collapse of the shrimp industry due to the appearance of the disease caused by the white spot syndrome virus (WSSV, for its acronym in English), which emerged globally as one of the most common, frequent and lethal pathogens for shrimp populations (Alvarado et al. 2016) .

In this context, the following work seeks to determine the economic and financial feasibility of a technically managed farm that not only increases the production of high quality protein, but can also serve as a reference for this type of livestock exploitation to strengthen, dynamize and diversify the economic income of the peasant families of our country. Under this criterion, the following objectives are proposed:

- Determine the initial investment required for the implementation of a limited number of red tilapia in the Sucua canton Province of Morona Santiago.
- Establish the operating costs required for the optimal development and production of this important species of zootechnical interest.
- Calculate the economic and financial feasibility of this production system under certain management characteristics.

As part of the development of this article, it is necessary to describe the characteristics of both the feasibility calculation process, as well as to make a description of the characteristics of red tilapia, aspects that are important to understand and contextualize the information presented in this document, so the following information is described:

Red tilapia.

Red tilapia (Oreochromis sp.) It belongs to the Cichlidae family, and they deposit their eggs in holes dug in the sediment, the parents are responsible for ensuring their safety until they reach the age of juveniles. in the genus Oreochromis females incubate eggs in the mouth and in species of the genus Sarotherodon oral incubation is paternal or biparental (Jácome, et al, 2019).

Although the exact date that this species was introduced in the equator is not known there is information that the Oreochromis mossambicus was introduced from Colombia to Santo Domingo de los Tsáchilas, in the year of 1969, the Oreochromis *niloticus,* was brought to the Ecuador by farmers bracileños in the year of 1974 and the red hybrid *Oreochromis sp* It was introduced at the beginning of the 80s for the practice of aquaculture, in the rivers of Chone (Zambrano, et al. 2006) .

According to Ecuador, the production of (Guzmán, 2015) red tilapia is led by companies such as Aquamar, Indumar, Marfrisco, El Rosado, El Garzal, Modercorp and Empagran, of which the first is the best in infrastructure and technological development, due to its level of investment and the availability of the market. or international for your product.

In general terms, when analyzing the production of red tilapia in Ecuador we can show that this product occupies the second place in aquaculture exports reaching a sustained growth of 7% per year; its international sale is made to the markets of North America and Europe, however it is to the United States market that our product reaches in greater proportion, including, tilapia occupies the third place of imports of aquaculture products, after the camaron and Pacific salmon.

With regard to feeding, red tilapia in its natural state consumes: algae, benthos, and in extreme cases filter the zooplanton, this means that in artificial breeding systems fish generally do not have access to this type of food, which forces us to provide high quality diets that can reach up to 35% protein in juveniles, and up to 24% in the fattening stage, guaranteeing the required supply of nutrients, which allows the animal to express all its genetic value, valued in the productive and reproductive parameters(Pronaca , s.f.). Another important aspect to consider within the feeding processes is the particle size of the food and the capacity that it must have of buoyancy to avoid losses by anointing, with respect to the first particle size must be directly related to the growth phase, which determines the size of the mouth of the fish.

With regard to general management we can state that the most sensitive aspect in its production is: food, water quality, temperature, factors that insiden in the definition of productive and reproductive parameters; According to this criterion, first quality water must be guaranteed, that is, it must contain at least 3 mg / l of oxygen, free of contaminants that put the life of the fish at risk. As for the temperature, its caloric commodity index is located in t° of 20 to 30 ° C, at 15 ° C the animal decreases its feed consumption until at T ° of 11 ° C practically the fish stops consuming food(Saabedra, 2006).

The pre-feasibility and feasibility study**.**

(Paniagua, 2016) He points out that prefeasibility is defined as a quantitative research that seeks to evaluate the different economic variables that determine the financial sustainability of an investment.

(Questión pro , s.f.) states that a fatibility study should consider the following aspects:

- The Diagnosis of the current situation, which identifies the needs that the project should solve and is based on both primary and secondary information.
- Determine the situation without a project, which is a description of the consequences that a given population would have if the project is not executed.
- The technical study, which is nothing more than the description of the processes and methodology necessary for the definition of the different activities required for the fulfillment of the objectives of the project.
- The size of the project that is a function of unmet demand and the investment capacity required for its implementation.
- The location of the project, which includes the analysis of strategies for the supply of inputs, displacement of personnel and distribution of products.
- The analysis of the current legislation applicable to the project in specific topics such as environmental pollution and waste disposal and tax legislation.
- Socioeconomic evaluation that allows evaluating the cost benefit and how these investments affect the lives of the people who are within the project.
- The financial evaluation that is aimed at determining sustainability, that is, the possibility of existence of the project when it no longer has financing
- The sensitivity and/or risk analysis, when the scenarios on which the project was built are modified

- Finally, the conclusions of the study that allows recommending aspects such as: Postponement, Reformulate, or continue the investments of the project towards the determination of feasibility.

As for the feasibility study for , this (Guerrero, 2004)contains all the components of the prefeasibility study, the difference marks that this phase is analyzed in detail certain aspects that are key to the development of the project, such as whether there are contracts of intention to sell the products and by-products that the project as a whole will generate, You must have the budget description of the different investments to be made as well as the quotes of the suppliers. In general, in this phase, the reliability of the information presented during the prefeasibility phase is determined, which underpins the decisions made in the previous phases of the project.

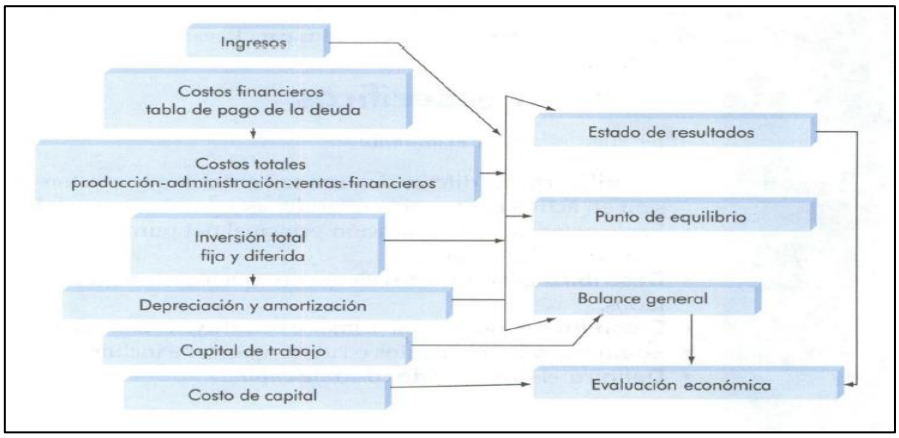
(Cordova, 2011), considers that feasibility is a process in which the viability of the investment is determined and has different types to describe: Technical, environmental, legal, economic, political, management feasibility, which together allow analyzing the different components, the strength on which the fulfillment of the objectives of the project is based.

Economic study.

In this phase of the project, the need for resources demanded by the actions proposed as part of the execution of the project is analyzed, that is, a detailed analysis of the income of all the products and by-products generated, as well as the necessary costs and the way these will be financed for the implementation of the project(Cordova, 2011).

For the (Read, 2006) feasibility ofeconomic analysis, it determines the amount of resources (money) necessary for the realization of an investment, as well as the return that is generated and raises the following structure:

Figure 1:
Structure of the economic study.



Source: Urbina 2010.

Within the economic and financial study we must determine the need for resources that must be used in the investment, and, according to the investment (Cordova, 2011) of a project can be classified into two components, the first that refers to fixed investment that is, the resources destined to infrastructure, machinery, tools and all the fixed assets that are neededc Itan to leave ready, and start with the operation or generation of goods; The other component refers to the

amount of money required for the operation of the project until it has the capacity to generate its own income, and that these cover at least the costs of oppeación, this component is known as initial working capital that added to the resources necessary for the investment. Fixed result in the total investment required for the implementation of the project.

Another aspect to be considered within the economic and financial study is the determination of the costs that according to , (Sanchez, 2020)states that, cost is any expenditure of resources that is required to be made for the generation of goods or services, can be of various types but generally they are divided into fixed costs, which are those that are made independently of the niveles of production that is to say that they must be paid if they occur zca or not, as an example we have the payment of basic services, salary of workers etc; and variable costs that are those that are directly related to the level of production, that is, they vary according to the number of units of goods or services produced, as an example we have the cost of raw material.

From the determination of the costs, it is necessary to generate the financial statements: income statement and projected cash flow according to the project horizon; For the income statement it serves to determine the projected net income, (Read, 2006) and that results from the total subtraction of income minus expenses; for , the (Cordova, 2011)cash flow of agreement is an important financial statement within the evaluation of projects since it generates the necessary information to determine the profitability indices A In the first we can determine the projected profit according to the horizon of the project, and the second generates the information required for the calculation of profitability indices.

Figure 2:
Structure of the income statement.

Cuentas	Cifras				
	Año 1	Año 2	Año 3	Año 4	Año 5
Ventas netas Costos de ventas = Utilidad bruta Gastos de administración Gastos de ventas = Utilidad operativa Ingresos no operativos - Gastos financieros - Otros egresos = Utilidad antes de impuesto - Provisión para impuesto = Utilidad neta					

Fuente Córdova (2011).

Figure 3.
Cash flow structure

CUENTAS	CIFRAS				
	Año 1	Año 2	Año 3	Año 4	Año 5
SALDO INICIAL DE CAJA Ingresos por ventas Recuperación de cartera Rendimientos financieros Otros ingresos nooperativos Aportes de capital Recursos del crédito					
TOTAL INGRESO EN EFECTIVO					
Costos de ventas Cuentas por pagar Costos indirectos de fabricación Gastos de administración Gastos de ventas Gastos financieros Otros egresos Pago de impuestos Pagos de dividendos Amortización de créditos Compra de activos fijos					
TOTAL EGRESOS EN EFECTIVO					
SALDO FINAL DE CAJA[3]					

Source: Córdova (2011)

Finally, within the economic and financial study, it is necessary to analyze the determination of the profitability indices described below:

- The net present value (NPV) that according to , (Morales, 2020)is also known as net present value and consists of comparing the value of the flows subjected to an adjustment or update factor, with the initial investment; this allows us to determine if a project will be profitable or not, also allows us to make comparisons between the NPV of several projects and thus make the decision, about the project in which we must invest; It responds to the following ecuacion.

Equation 1
Net current value

$$VAN = -I_0 + \sum_{t=1}^{n} \frac{F_t}{(1+k)^t} = -I_0 + \frac{F_1}{(1+k)} + \frac{F_2}{(1+k)^2} + \cdots + \frac{F_n}{(1+k)^n}$$

Source: Morales 2020.

From where:
•Ft= Money flows in each period t
•I° = Initial investment.
•n= Time periods
•K = Discount rate or bank interest of the credit received to finance the I°
For , (Cordova, 2011)the NPV is a financial indicator that allows us to bring present value a project flow over time product of an investment analyzed, and interprets as follows:

Tabal 1
The following indicated in analysis is the Internal Rate of Return (IRR)

Value	Meaning	Decision to make
FROM>0	The investment would produce profits above the required ® profitability	The project can be accepted
FROM<0	The investment would produce profits below the required profitability	The project should be rejected
FROM=0	The investment would produce neither profit nor loss	Since the project does not add monetary value above the required profitability (r), the decision should be based on other criteria, such as obtaining a better market positioning or other factors.

Source: Córdova (2011).

Another indicator that we build from the flow of caga is the Internal Rate of Return (IRR), which, (Cordova, 2011)conceptualizes it as the interest rate or profitability that the project will throw in the period of time evaluated, also indicates the value of the discount tasthat is required for the NPV to be equal zero, That is to say that it provides us with the minimum value that the investment generates so as not to produce losses. To determine the value to be accepted a, the minimum value aqu will be considered the IRR where the NPV is equal to zero.

For , the (Arias, 2020)internal rate of return indicates the profitability generated by an investment, and responds to the following equation:

Equation 2:
Internal rate of return:

$$VAN = -I_0 + \sum_{t=1}^{n} \frac{F_t}{(1+TIR)^t} = -I_0 + \frac{F_1}{(1+TIR)} + \frac{F_2}{(1+TIR)^2} + \cdots + \frac{F_n}{(1+TIR)^n} = 0$$

Source: Arias 2020.

- If IRR > k, the investment project will be accepted. In this case, the internal rate of return we obtain is higher than the minimum rate of return required for the investment.
- If IRR = k , we would be in a situation similar to that which occurred when the NPV was equal to zero. In this situation, the investment can be carried out if the competitive position of the company improves and there are no more favorable alternatives.
- If TIR < k , the project should be rejected. The minimum profitability that we ask for the investment is not reached.

Finally within the analysis of this component we have the cost benefit, which according (Cordova, 2011) to the realtion between the income versus the expenses and gives us as a result an index that determines if the project is ac eptado for its investment or not: in that sense it points out that if the value of the index obtained is greater than 1 the project is accepted otherwise it is rejected and responds to the following Equation:

Equation 3:

Cost benefit.

$$RELACIÓN\ BENEFICIO\ COSTO = \frac{\Sigma \text{ VP Ingresos Netos}}{\text{Inversión Inicial}}$$

Trading channels

According to him, commercialization (Bancomex, n.d.) channels are the means used to design, develop, implement and operate sales programs and strategies for the proper commercialization of products, goods or services that allow companies to acquire and maintain satisfied customers in national and international markets.

(Sanchez, 2020) , points out that: marketing channels are defined by the different phases or stages through which a product passes, so that its ownership passes from one hand to another; Dfrom the manufacturer to the consumer or end-user.

Within these concepts it is important to mention theside (Sanchez, Trading Channels, 2020) because it determines the main functions of the comedylization and distribution canles, the same as detailed below:

- Transport
- Organize the offer.
- Store products
- Contact the target audience
- Offer variety of products
- Participate in marketing activities.
- Normalize business transactions
- Generate customer satisfaction

Types of marketing channels.

There are two types:

Wholesaler: which is defined as an intermediary between the manufacturer and retailers, engaged in the sale of products and services in large quantities, which will be sold either to other wholesalers or manufacturers or, mainly, to retailers. Retailer which is one that links the offer of wholesalers and manufacturers with the final consumer of the products and, like the wholesaler, perform functions apart from the generic ones that justify their existence, such as grouping the products of different suppliers and creating an assortment for the final consumer, granting credit and payment facilities to customers in their purchases, among others.

Based on these definitions and considering that through a survey it was determined that 47.61% of potential consumers prefer fresh tilapia, two strategies will be used as a marketing channel, the first will be sold at the production site, and the second will be distributed to small traders in the province.

2. METHODOLOGY.

The present work is subtenta on a descriptive quantitative research that is basedon the generation of data, which will be analyzed and interpreted through mathematical processes, and considered the moments described below:

- A total of 8,500.00 kg of tilapia will be produced for sale according to the following details: 2000 kg in year 1, 3000 kg in year 2, and 3500 in year 3. It is important to measure the production volumes indicated are within the unsatisfied demnda caculada.
- The weight of the fish for sale will be on average 0.25Kg
- According to the volume of production, the construction of 3 pools with a capacity to hold 134 cubicmeters of water sufficient volume is required to optimally maintain the number of animals required by demand.
- The productions will be staggered in such a way that we can guarantee the permanent supply of the product to our market.
- Collection and generation of data, referring to the costs of infrastructure, machinery and necessary inputs that guarantee efficient production, safeguarding the health of consumers.
- From this information we determine the amount of the investment required, considering that the necessary resursos for the fixed investment and the initial working capital must be calculated, a value that is important to guarantee the availability of money necessary to stabilize the market of the good or loanorproduct that the project will generate.
- We determine the total amount of the investment factor that is important to know the amount of money needed and how these values should be financed.
- Subsequently, the necessary resources for the operation of the project (operating costs) are determined.
- From these values we determinate thefinancial statements (income statement, and cash flow), essential information to subject the project to profitability indices that allows us to determine the feasibility or not of the investment in analysis.

3. RESULTS.

Once the information was analyzed , we obtained the following results:

Initial investment.

What corresponds to the determination of the resources necessary to be able to start the production of red tilapia: information that is presented in the following table.

Table 2:
Capital requirements for the initial fixed investment.

CONCEPT	**TOTAL**
1. CONSTRUCTIONS	$ 5.150,00
2. EQUIPMENT	$ 172,00
4. FURNITURE	$ 1.748,00
5. OFFICE EQUIPMENT	$ 1.099,00
TOTAL	$ 8.169,00

Source: Fieldwork.
Prepared by the Authors

Table 3
Total investment requirement

CONCEPT	AMOUNT
INITIAL FIXED INVESTMENT	$ 8.169,00
INITIAL WORKING CAPITAL	$ 3.488,40
TOTAL	$ 11.657,40

Source: Fieldwork.
Prepared by the Authors

Table 4
Operating costs.

CONCEPT	TOTAL
FIXED COSTS	$ 24.120,00
Manager	$ 10.800,00
Worker	$ 10.800,00
Accountant Secretary	$ 1.800,00
Basic Services	$ 720,00
Office supplies	$ 720,00
VARIABLE COSTS	$ 8.558,60
Feeding	$ 5.583,60
Fingerlings	$ 2.255,00
Animal health	$ 720,00
TOTAL	$ 32.678,60

Source: Fieldwork.
Prepared by the Authors

Table 5
Depreciation

CONCEPT	COST	SUB TOTAL	RESIDUAL VALUE
CONSTRUCTIONS	5. 150,00	7. 72,5	4. 377,5
TEAM	172,00	51,6	120,4
FURNITURE	1. 748,00	524,4	1. 223,6
OFFICE TEAM	1. 099,00	329,7	769,3
TOTAL			

Source: Fieldwork.
Prepared by the Authors

Table 6
Financing plan

CONCEPT	AMOUNT
Provide credit	5. 150,00
Own contribution	3. 019,00
TOTAL	8. 169,00

Source: Fieldwork.
Prepared by the Authors

Table 7
Debt service.

CREDIT CHARACTERISTIC	**YEARS**	**BUSINESS**	**FEE TO PAY**
CREDIT BAN ECUADOR 11% INTEREST TO 36 MONTHS TERM	1,00	$ 566,50	$ 2.283,17
	2,00	$ 377,67	$ 2.094,33
	3,00	$ 188,83	$ 1.905,50
TOTAL			$ 6.283,00

Source: Fieldwork.
Prepared by the Authors

Table 8
Description of production.

YEARS	KILOGRAMS OF TILAPIA PRODUCED	UNIT COST	INCOME FROM SALE
1	2.200,00	5,00	$ 11.000,00
2	3.300,00	5,50	$ 18.150,00
3	4.400,00	6,00	$ 26.400,00
TOTAL			$ 55.550,00

Source: Fieldwork.
Prepared by the Authors.

Table 9

Income statement.

CONCEPT0	YEAR 1	YEAR 2	YEAR 3
TOTAL, REVENUE	$ 11.000,00	$ 18.150,00	$ 26.400,00
For sale Red tilapia	$ 11.000,00	$ 18.150,00	$ 26.400,00
Variable Costs	$ 2.008,80	$ 2.860,20	$ 3.689,60
GROSS UFRUCTALITY (C. Variables - Income)	$ 8.991,20	$ 15.289,80	$ 22.710,40
Fixed costs	$ 4.968,00	$ 4.968,00	$ 4.968,00
OPERATING PROFIT (Gross Profit - Fixed C.)	$ 4.023,20	$ 10.321,80	$ 17.742,40
Financial Costs	$ 566,50	$ 377,67	$ 188,83
PROFIT BEFORE PARTICIPATION TO WORKERS (Operating Profit - C. Financial)	$ 3.456,70	$ 9.944,13	$ 17.553,57
Worker participation	$ 518,51	$ 1.491,62	$ 2.633,04
PROFIT BEFORE TAXES (Profit Before participation - Employee participation)	$ 2.938,20	$ 8.452,51	$ 14.920,53
Income taxes (It does not reach the tax base therefore no income tax is generated)	$ 440,73	$ 1.267,88	$ 2.238,08
NET INCOME (Profit before tax- Income tax	**$ 2.497,47**	**$ 7.184,64**	**$ 12.682,45**

Source: Fieldwork.
Prepared by the Authors.

Table 10

Cash flow

CONCEPT	PRE-OPERATIONAL	YEAR 1	YEAR 2	YEAR 3
OPERATING INCOME		0	0	0
Sales		11. 000,00	1. 8150,00	2. 6400,00
OPERATIONAL WEIGHTS		0	0	0
Fixed costs		4. 968,00	4. 968,00	4. 968,00
Variable costs		2. 008,8	2. 860,2	3. 689,6
SUB TOTAL		6. 976,8	7. 828,2	8. 657,6
OPERATIONAL FLUO	0,00	4. 023,2	10. 321,8	17. 742,4
NON-OPERATING INCOME	0,00	0	0	0
Initial input proper	5.150,00	0	0	0
Parish Gad Contribution	3.019,00	0	0	0
Residual value of depreciation	0,00	0	0	6. 490,8
SUB TOTAL	8.169,00	0	0	6. 490,8
NON-OPERATIONAL EXPENDITURES	0,00	0	0	0
Initial fixed investment	8.169,00	0	0	0
Initial working capital	3.488,40	0	0	0
Projected financial costs		566,5	377,66	188,83
Projected credit amortization		1. 716,66	1716,66	1716,66
Worker participation		518,505	1491,62	2. 633,03
Income tax		440,72925	1267,877	2. 238,07
Working capital requirement	8.169,00	0	0	0
SUBTOTAL	19.826,40	3. 242,40	4. 853,83	6. 776,61
NON-OPERATIONAL FLOW	($ 11.657,40)	-3. 242,40	-4. 853,83	-285,81
NET FLOW	($ 11.657,40)	780,79	5. 467,96	17. 456,58
OPENING CASH BALANCE	$ 0,00	-11. 657,4	-10. 876,60	-5. 408,63
FINAL CASH BALANCE	(11.657,40)	-10. 876,60	-5. 408,63	12. 047,95

Source: Fieldwork.
Prepared by the Authors.

Financial indices.

SHOOTING.	30,53%
FROM	$5.200,02
B/C	1,43

4. CONCLUSIONS.

The results indicate that the level of investment required for the implementation of a tilapia production project is not significant compared to other zootechnical productions.
By analyzing the income generated by tilapia we were able to establish that they are important and in combination with another farm production system contribute to the strengthening of the family income of rural families, generating sustainability to the entire rural productive unit.
Another important aspect to highlight is that tilapia meat contains protein of high biological value, which contributes to the food security of rural families in the eastern region of our country.
Finally, when analyzing the feasibility we can determine that the project is financially sustainable since its internal rate of return (30.53%) is higher than the discount rate, the net present value ($ 5,200.02) is greater than zero which indicates that the project generates profitability, benefit consisted of 1.43 that indicates that for every dollar of investment the project generates 43 cents of profit.

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