SYSTEMS & MANAGEMENT
Electronic magazine

ANALYSIS OF THE ECONOMIC VIABILITY OF A SMALL PASSION FRUIT PRODUCER IN BOCA DA MATA, ALAGOAS

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ABSTRACT

Family farming is deficient in terms of indicators on the economic viability of its plantations, so most small Brazilian producers are unaware of the economic return on their business. This work aimed to analyze the economic viability of a yellow passion fruit plantation belonging to a small producer located in Boca da Mata, Alagoas, Brazil. In order to perform the analysis, the costs and revenues that were applied in the net present value (NPV), internal rate of return (IRR), benefit/cost ratio (B/C) and simple payback (PBS) methods were quantified. Satisfactory results were obtained with this application, since all were positive in the four tools described previously, which, consequently, resulted in the certification of the economic viability of the enterprise.

Keywords: Economic Viability; Plantation; Passion Fruit.

PROPPI / LATEC
DOI: 10.20985/1980-5160.2018.v13n3.1404

Electronic Journal of Management & System
Volume 12, Number 3, 2018, pp. 357-365
DOI: 10.20985/1980-5160.2018.v13n3.1404

1. INTRODUCTION

According to the Brazilian Service of Support to Micro and Small Enterprises (Sebrae, 2016), the fruit market is one of the sectors that has the most prominence in Brazilian agribusiness, leaving Brazil in third place in the world ranking. According to the Brazilian Agricultural Research Corporation (Embrapa, 2016), the Northeast region of Brazil is the leader in the production of yellow passion fruit and stands out with a participation of 64.9% nationwide. Although the market is favorable, the current economic scenario is declining with a forecast for stabilization only in 2018, and investing in this scenario may represent a major risk.

Despite the economic adversity described above, the state of Alagoas ranks 15th in the production of yellow passion fruit, taking into account all Brazilian production (Embrapa, 2016). In view of this scenario, there is a new yellow passion fruit producer from the city of Boca da Mata, located in the eastern mesoregion of Alagoas and São Miguel dos Campos microregion of the state, where yellow passion fruit is one of the cultivation options for small local producers who try to make use of the region's competitive advantage and survive in the midst of the economic crisis.

The economic viability analysis is an important tool for companies that are entering new markets, since it gives the manager the opportunity to make decisions to invest or not in a production, according to its profitability. However, Brazilian family farming still has a deficiency in terms of the use of these tools, so that small producers are unaware of the economic viability of their productions.

Therefore, it is important to verify the economic viability of the yellow passion fruit production of this small producer who is beginning its production in Boca da Mata, Alagoas. In this way, the manager can analyze in a precise way whether or not the enterprise will suffer a loss, taking into account a long-term forecast.

The objective of this work is to evaluate the economic viability of this small producer, through projections of revenues, costs and investments, as well as to analyze indicators that will serve as a basis for future producers who seek to enter agribusiness.

2. THEORETICAL REFERENCE

According to Duarte et al. (2011), the importance of a more accurate analysis of the economic viability of a new business plan project, before the company's incorporation, allows analyzing the return and risks, as well as projecting its expected revenue, costs and expenses for the final result of the project.

On the techniques of investment analysis, Stoll (2015) states that the net present value indicator (NPV) is used to evaluate whether a project should be accepted or rejected. This aid in decision making is given by the difference between the present value of the net cash inflows and the initial investment. When the NPV is positive, the project is profitable; otherwise it will cause loss.

According to Lizote et al. (2014), the internal rate of return (IRR) is an indicator of the financial result in the form of a rate. Its calculation is performed through the difference between inflows and outflows, where the value obtained is compared to the hurdle rate. If the result found is greater than or equal to the hurdle rate, the investment made is considered economically viable.

According to Strohhecker (2010), the simple payback (PBS) is a tool used to measure how long it will take for investors to have the return on invested capital. Their results are obtained by the ratio of the value of the investment to the value of the cash flows.

There are many studies in the literature that make use of the economic viability analysis, as is the case of Schena et al. (2012), who carried out a market research, as well as a financial analysis with the objective of identifying the market and economic feasibility of opening a stationery store in the city of Ibirapuitã, Rio Grande do Sul. After the evaluation of the collected data, it was verified that the enterprise in question had space in the market and was economically feasible. These assertions were substantiated by market research and liquidity and profitability calculations, based on the TIR, NPV and PBS indicators.

In addition, Rosa (2015) aimed to verify the economic viability of a dairy cattle project in the city of Brunópolis, western Santa Catarina. The indicators used for feasibility analysis were NPV, TIR and PBS. An investment risk analysis was also carried out, through the use of the sensitivity analysis, which found that the project is economically feasible under deterministic conditions and under risk conditions.

The case studies presented in the literature provide support for the strengthening of the use of these investment analysis tools in the present work. In addition, studies were carried out with the same objective of this article, that is, studies that analyzed the economic feasibility of planting other crops, such as Zanatta (2015), who carried out an analysis of the economic viability of semi-hydroponic strawberry production in São João do Sul, Santa Catari-

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na. The author collected data through interviews with the municipality's producer and used the economic viability analysis methods NPV, IRR and the economic PBS, and the investment risk analysis using the sensitivity analysis, noting that the activity is economically viable.

Moraes (2009), who analyzed the economic and financial viability of the implantation of a raisin plant in the municipality of Lagoa Grande, Pernambuco, presented a positive final result with a possible economic and financial pre-feasibility of the project, in view of the estimated first four years. For this analysis, primordial data for the preparation of worksheets and tables of the pre-feasibility of the project were collected through the TIR methods along with theories and definitions of several authors.

Vasconcelos et al. (2010), in turn, verified the hypothesis of the existence of economic viability for small-scale banana production in Agropolo do Baixo Acaraú, state of Ceará. Through financial evaluation metrics, such as the benefit/cost analysis, NPV, IRR and sensitivity analysis had the objective of attesting the economic feasibility of the production. Thus, the results lead us to accept the hypothesis of the existence of economic feasibility of production.

3. METHOD

The work has an exploratory character, as it aims to provide greater familiarity with the problem, through a bibliographical survey, and has as technical procedure an experimental character that, according to Gil (2008), seeks to select the variables that would be able to influence the researchers in the form of controlling and to observing the effects that variables produce on the object.

Through some financial mathematical tools it is possible to carry out a study of the economic viability of the passion fruit production process. According to Holanda (2011), from the analysis of investment, instruments that may help in the decision making regarding its economic-financial situation will be obtained.

The investment in passion fruit production will be evaluated by the following criteria: NPV, IRR, benefit-cost ratio and PBS.

All these criteria take into account the hurdle rate, which is the interest rate of the financial market, which remunerate the cash flow investment.

In this analysis, the investment is made through the purchase of equipment and raw material for the initial production, in addition to production costs and income from passion fruit.

The data on investments, costs and revenues used in this work were collected only for six months, since their activities were started in this period, and do not have previous data. Subsequently, they were inserted in the tools described previously, through which it was possible to perform the analysis of the results obtained.

Criterion of net present value (NPV)

According to Ferreira (2000), the NPV estimates the net profit or loss of a project before its implementation, obtaining as an answer the NPV of the project under analysis from equation 1. For the project in question to present economic viability, NPV needs to be positive.

$$VPL(i_M) = -I + \sum_t^n = 0 \frac{R_t - C_t}{(1+i_M)t} \quad (1)$$

where:

NPV = net present value of the investment project;

I = investment or capital invested;

R_t(t = 0, 1, 2, ..., n) = revenue at the end of period t;

C_t(t = 1, 2, ..., n) = cost or expense at the end of period t;

n = project life;

$_i$M = minimum rate of attractiveness, i.e. interest rate.

Internal Rate of Return (IRR)

According to Ferreira (2000), the economic evaluation from the IRR is the determination of an unknown rate i in equation 1, which represents the NPV, equaling zero. This unknown is the IRR of the investment alternative, whose result means the own periodic profit rate of the analyzed project.

The parameter used to decide on the economic viability of the project will be the hurdle rate (iM). The cross between the internal rate of return of the project (i) and the hurdle rate (iM) will indicate whether or not there is a return when the project under analysis is executed.

Understanding: if i> iM = the project is economically profitable and therefore should be carried out; if i <iM = the project must be rejected economically and the in-

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vestment must be applied in the capital market; if i = iM = it means indifference in terms of the application of financial resources.

In the project under analysis the IRR will be determined and the comparison with the hurdle rate should be carried out, determining whether the passion fruit production process will have a positive or negative return.

Cost-benefit ratio criterion

According to Ferreira (2000), the benefit-cost ratio is obtained through the relationship between the present value of the benefits and the present value of the costs, and whose result allows asserting that the project is economically viable when this indicator - R (iM) - is greater than unity, or the minimum is equal to it. To do so, equation 2 is used.

$$R(i_M) = \frac{VPL\ Benefícios}{VPL\ Custos} \quad (2)$$

The cost-benefit ratio method is as follows:

$$R(i_M) = \sum_{t=0}^{n} \frac{B_t}{(1+i_M)t} \Big/ \sum_{t=0}^{n} \frac{C_t}{(1+i_M)t} \quad (3)$$

where:

R_iM = benefit-cost ratio updated at the minimum rate of attractiveness (iM);

B_t = benefits on date t;

C_t = cost on date t;

$_iM$ = minimum rate of attractiveness.

In the cost-benefit analysis of the passion fruit production process, the cost will be interpreted as the costs of investment in the implementation and costs of operation (cultivation, extraction and production), and the benefits are related to the annual revenues.

Simple Payback (PBS)

According to Ferreira (2000), the PBS is a practical and simple method of satisfactory answers for analysis, which is used in the decision making of investment, in the short and long term vision, for a minimum rate of null attractiveness ($_iM$= 0). The PBS uses the cash flow to define how long the investment will bring back to the entrepreneur, as can be seen in figure 1. For example, if L1+L2 ≥ Co, this means that the return time of this investment will be in the period Z.

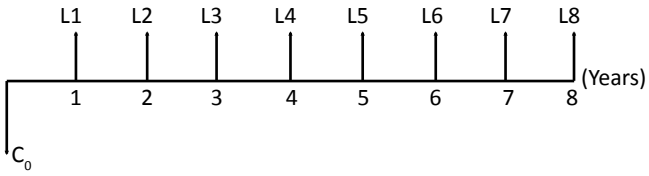

Figure 1. Cash flow
Source: Adapted from Ferreira (2000).

Then, using the four tools mentioned above (NPV, IRR, PBS and cost-benefit ratio) it will be possible to obtain concrete data, which, with their proper interpretation, will serve as drivers to determine the economic viability of the investment.

4. RESULTS

This study is carried out in a family business which has recently joined the fruit industry. For this reason, its main problem is given by the high degree of uncertainty regarding the economic viability of the enterprise.

Regarding the productive process, its accomplishment is given as follows: two employees are sent to the planting to harvest the fruits, which are placed in boxes and stored in a garage located a few meters from the plantation. This process is repeated from Monday to Friday; on Saturday the goods are loaded onto a private vehicle owned by the producer. Subsequently, the merchandise is delivered to a fruit pulp factory located in the municipality of Anadia, Alagoas. Table 1 shows the investment data on the yellow passion fruit cultivation carried out by the small producer, who provided the information.

In Table 1, the items fertilizer, plantation workforce and urea are products and processes that will be reapplied every two years in relation to the eight years of the useful life of the investment.

Table 2 presents the cost and revenue data of the passion fruit production and marketing.

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Table 1. Production investments for the cultivation of yellow passion fruit with useful life of eight years

Name	Quantity	Unit	Unit Cost	Total
Seed	1.000	Unit	R$ 0,285	R$ 285,00
Fertilizer	10	Kg	R$ 55,00	R$1.100,00
Application workforce	2,5	Daily	R$ 40,00	R$ 100,00
Plantation workforce	4	Daily	R$ 190,00	R$ 760,00
Preparation workforce	14	Daily	R$ 38,57	R$ 540,00
Plastic bag	1.000	Unit	R$ 0,02	R$ 20,00
Urea	2	Kg	R$ 35,00	R$ 140,00
Poison	10	liter	R$ 14,00	R$ 140,00
Adapter 3 PL	1	Unit	R$ 4,50	R$ 4,50
Female adapter	1	Unit	R$ 14,00	R$ 14,00
Sprinkler	3	Unit	R$ 25,00	R$ 75,00
50 handle wrist	20	Unit	R$ 18,00	R$ 360,00
PRC 50	11	Unit	R$ 2,50	R$ 27,50
PRC 50 tiger	1	Unit	R$ 4,00	R$ 4,00
Adhesive tube	2	Unit	R$ 3,50	R$ 7,00
Curve 2 PL 45	1	Unit	R$ 30,00	R$ 30,00
Curve 3 PL	2	Unit	R$ 15,00	R$ 30,00
Curve 50	2	Unit	R$ 16,00	R$ 32,00
Glove 2 PL	1	Unit	R$ 20,00	R$ 20,00
Glove 3 PL	15	Unit	R$ 9,00	R$ 135,00
Glove 3 PL	10	Unit	R$ 6,00	R$ 60,00
Glove with thread 3 PL	1	Unit	R$ 26,00	R$ 26,00
Female point 2 PL	10	Unit	R$ 13,00	R$ 130,00
Female point 3 PL	3	Unit	R$ 15,00	R$ 45,00
Male point 2 PL	10	Unit	R$ 25,00	R$ 250,00
Record 50	10	Unit	R$ 16,00	R$ 160,00
Adhesive Tube 75	2	Unit	R$ 15,00	R$ 30,00
Adhesive Tube 75x50	10	Unit	R$ 11,00	R$ 110,00
Pipe coupling 2 PL	10	Unit	R$ 40,00	R$ 400,00
Veda thread	1	Unit	R$ 9,20	R$ 9,20
Total investment				R$ 4.424,20

Source: Research Data, 2017.

PRC: polypropylene random copolymer; PL: pneumatic line

Table 2. Costs and revenues of the production and marketing of passion fruit

Month	Cost	Revenue
January	R$ 1.070,00	R$ 3.337,00
February	R$ 1.220,00	R$ 725,00
March	R$ 1.400,00	R$ 2.297,00
April	R$ 1.700,00	R$ 3.012,00
May	R$ 1.120,00	R$ 2.817,00
June	R$ 320,00	R$ 455,00
Total for the period	R$ 6.830,00	R$ 12.643,00
Total annual	R$ 17.100,00	R$ 25.286,00

Source: Research Data, 2017.

From the above mentioned problem, it was considered necessary to apply the NPV, IRR, benefit-cost ratio and PBS tools, which allowed the cash flow elaboration, shown in figure 2, with the data obtained in Tables 1 and 2.

Cash flow was projected for eight years due to the useful life of the project and changes in values were due to the need to make a new investment in those periods, in which the flow is responsible for quantifying in how soon the enterprise will have the return of the amounts invested.

As mentioned previously, the NPV quantifies the net

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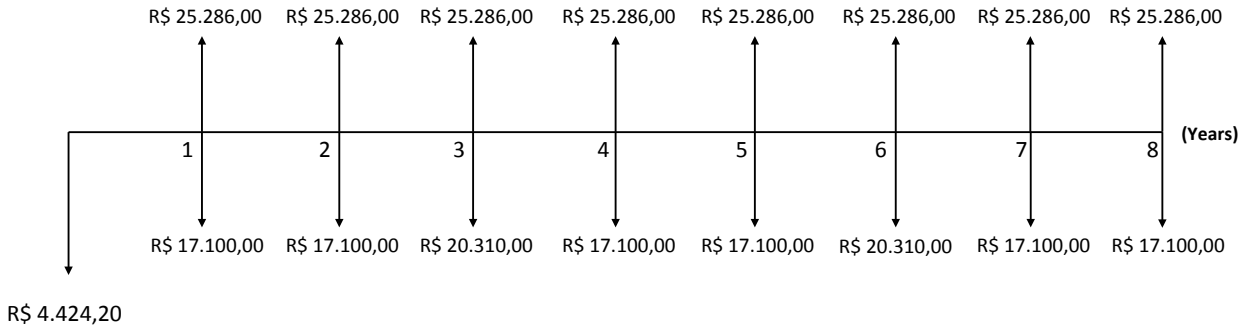

Figure 2. Flow of cash from the productive process of yellow passion fruit
Source: Authors, 2017.

profit or loss of a project and, for its execution, in addition to using the costs and revenues shown in the cash flow of figure 2, it is necessary to obtain the minimum attractiveness rate (iM) which is 9.5% per year in the current year. Thus, the NPV of this project is found by applying equation 1:

$$VPL(i_M) = -I + \sum_t^n = 0 \frac{R_t - C_t}{(1+i_M)t}$$

$$VPL\ (9{,}5\%) = -4.424{,}20 + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^1} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^2} + \frac{(25.286 - 20.310)}{(1 + 0{,}095)^3} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^4} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^5} + \frac{(25.286 - 20.310)}{(1 + 0{,}095)^6} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^7} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^8}$$

$$VPL\ (9{,}5\%) = R\$\ 35.746{,}78 \qquad (1)$$

According to the specification of the NPV, the yellow passion fruit project is economically feasible, since it has a value above zero. From the NPV it is possible to identify the IRR, which determines in the form of rate whether the project is feasible or not.

$$VPL(i_M) = -I + \sum_t^n = 0 \frac{R_t - C_t}{(1+i_M)t} = 0$$

$$0 = -4.424{,}20 + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^1} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^2} + \frac{(25.286 - 20.310)}{(1 + 0{,}095)^3} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^4} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^5} + \frac{(25.286 - 20.310)}{(1 + 0{,}095)^6} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^7} + \frac{(25.286 - 17.100)}{(1 + 0{,}095)^8}$$

$$i = 179\%\ a.a$$

As can be seen from the above calculation, the project is considered profitable, as the result is higher than the hurdle rate which is 9.5% a.a.

The third tool used in this project was the benefit-cost ratio, in which the benefits are annual revenues; and the costs is the sum of the investments made in the production of passion fruit.

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$$R(i_M) = \frac{VPL\ Benefícios}{VPL\ Custos} \qquad (2)$$

$$R(i_M) = \left. \sum_{t=0}^{n} \frac{B_t}{(1+i_M)t} \middle/ \sum_{t=0}^{n} \frac{C_t}{(1+i_M)t} \right. \qquad (3)$$

$$\frac{B_t}{(1+i_M)t} = \frac{25.286}{(1+0{,}095)^1} + \frac{25.286}{(1+0{,}095)^2} + \frac{25.286}{(1+0{,}095)^3} + \frac{25.286}{(1+0{,}095)^4} + \frac{25.286}{(1+0{,}095)^5} + \frac{25.286}{(1+0{,}095)^6} + \frac{25.286}{(1+0{,}095)^7} + \frac{25.286}{(1+0{,}095)^8}$$

$$\frac{C_t}{(1+i_M)t} = -4.424{,}20 + \frac{17.100}{(1+0{,}095)^1} + \frac{17.100}{(1+0{,}095)^2} + \frac{20.310}{(1+0{,}095)^3} + \frac{17.100}{(1+0{,}095)^4} + \frac{17.100}{(1+0{,}095)^5} + \frac{20.310}{(1+0{,}095)^6} + \frac{17.100}{(1+0{,}095)^7} + \frac{17.100}{(1+0{,}095)^8}$$

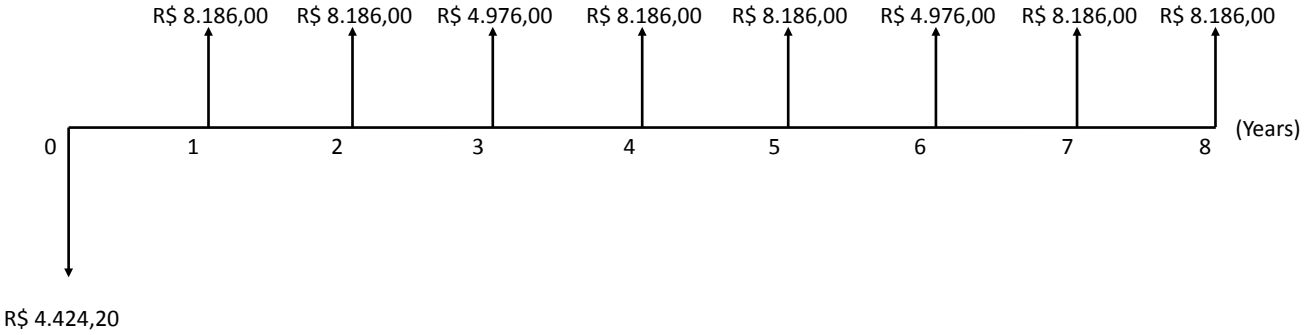

Figure 3. Flow of cash from the productive process of yellow passion fruit
Source: Research data, 2017.

The result of the calculation allows reaffirming the feasibility of the project, since the value obtained was greater than one. The last criterion to be evaluated in this project was PBS, with cash flow projected for eight years.

Based on figure 3, it can be seen that L1> Co, that is, the investment returns in the first year of activity. Thus, it is possible to reinforce the viability of the enterprise with the fourth evaluation criterion used in this project.

5. CONCLUSION

In the last years the fruit market has been growing a lot. Despite the favorable market environment, uncertainties in terms of economic viability when joining a new project are evident for small passion fruit producers. Therefore, in order to meet their needs four tools that are used to perform investment analysis (NPV, IRR, PBS and benefit-cost ratio) were applied.

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With the application of these tools, the first one was the NPV, where the result found, in the amount of R$ 35,746.78, is positive, affirming the viability of the project. The second was the IRR, with the value i=179%; this result was higher than the hurdle rate considered of 9.5% in the period studied, meeting the indicator requirement for project viability. The third benefit-cost ratio tool obtained value R=1.41320, which served to reinforce the profitability of the enterprise, since it has a value greater than one, and finally, the PBS, where the projection of cash flows for eight years of useful life proves that the investment has a fast return period in the first year, in which the time found for the project's return on investment is considered attractive for new entrepreneurs. Thus, all these applications are within the parameters desired for an economic viability analysis of a new project.

The credibility of the results should be emphasized because the data on costs and revenues that were used as the basis of the calculations are true and were passed on by the producer himself. With this, the text brings relevant information to numerous producers in Brazil who do not know this type of methodology and shows its relevance, because it uses simple application and handling methodologies where they are difficult to use by family farming in Brazil.

As a recommendation for future work it is necessary to consider the variables of the climate and water resources, as well as the fluctuations of the financial market. These data were not considered essential for this work, since the climate of the studied region is naturally conducive to cultivation, but they may help others.

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Received: 12 Mar 2018

Approved: 01 Aug 2018

DOI: 10.20985/1980-5160.2018.v13n3.1404

How to cite: Bandeira, H. T.; Amorim, T. N. G. F. (2018), "Analysis of the economic viability of a small passion fruit producer in Boca da Mata, Alagoas", Sistemas & Gestão, Vol. 13, No. 3, pp., available from: http://www.revistasg.uff.br/index.php/sg/article/view/1404 (access day month year).