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Economic evaluation of the Saladette tomato production project under greenhouse conditions

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Abstract

According to the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) today in Mexico there are around 20,000 hectares under protected agriculture. Of these, approximately 12,000 are greenhouse and the other 8,000 correspond to mesh shade and macrotunnel among other structures. The main crops grown under protected agriculture are tomato (70%), peppers (16%) and cucumber (10%). As the tomato is concerned, Mexico is in the tenth producers worldwide with an annual output of 3 million tons; this being the third most exported product in the country making it the world's largest exporter with a figure of 1.5 million tons per year, ie 50% of total production. In this research the results in the main indicators of profitability of a project saladette tomato production under greenhouse conditions on a planning horizon is five years.

Tomato, Greenhouse, Investment

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Introduction

The United Nations Food and Agriculture Organization (FAO) mentions that the global area of tomato production increased by 25% in the last decade. The most notable growth was in the People's Republic of China, which increased by 142%. Due to the increase in demand, world tomato exports have increased by 59%. Leading such exports are the countries of Spain, Mexico and the Netherlands.

According to SAGARPA, in 2008, 2.26 million tons of tomatoes were produced in Mexico, the main producer being the state of Sinaloa whose production represented 35% of the national total, 3.8 times higher than that produced by the second place, Baja California, with 9%. The states of Michoacán, San Luis Potosí and Jalisco continue to be listed with 8%, 6% and 5%, respectively. Among the types and / or varieties of tomato are mainly the ball, saladette or guajillo and cherry tomatoes, very sensitive to extreme climatic conditions, which determine their annual cycle and type of variety.

For the National Coordinator of Foundations Produce, AC (COFUPRO), protected agriculture in Mexico has taken a big boom in recent years, going from little more than 800 hectares in 2000 to 10,810 hectares in June 2009 at a rate of Average annual growth of 25% and almost one thousand percent during this same period of time, making the activity the most dynamic and fastest growing in the country within the agricultural sector. According to the Network of Technological Innovation in Protected Agriculture A.C., there are 300 hectares of protected area in the state of Guanajuato. According to the national trend, half of the area belongs to producers of 5,000 meters or more, while the remaining half belongs to small producers where most of them have been supported by state and federal subsidy programs.

For the purpose of financial appraisal of an investment project, economic profitability measures the ability of a company's assets to generate value, regardless of how they were financed and tax issues. An economic profitability may indicate: excess of investments in relation to turnover; Inefficiency in the development of procurement functions; Production and distribution; Or an inappropriate steering style.

Method description

The quantitative paradigm was used, applying the evaluation of an investment project through the operational analysis of a production project of tomato saladette under greenhouse conditions. For the evaluation of the project, traditional methods such as the internal rate of return, net present value, as well as the cost-benefit ratio were used. (García and Romero, 2009)

The formula for calculating NPV (Baca, 2006)

$$VAN = \sum_{t=1}^{n} \frac{Vt}{(1+k)^t} - \mathrm{I}_0 \qquad (1)$$

Where:

Vt = Cash flows of each period t

I0 = Initial disbursement of the investment

N = Number of periods considered

K = Interest rate

The formula for calculating the IRR (Baca, 2006) is:

$$VAN = \sum_{t=1}^{n} \frac{\mathrm{Ft}}{(1+\mathrm{TIR})^t} - \mathrm{I} = 0 \qquad (2)$$

Where:

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Ft = Cash flow in period t
N = Number of project periods
I = Initial investment

For the beginning of the work a collaboration agreement was established between students and professors of the Business Development career and the Sustainable and Protected Agriculture career, both of the Southwest Technological University of Guanajuato. The monitoring, recording and processing of information was carried out from January 2015 to June 2016. The project operations, those generating costs, generating income and control of tomato production were documented. Compiled the necessary information, the financial evaluation was applied considering a planning horizon of five years.

Results

The results obtained from the financial evaluation apply to the design of a technological package by the Technological University of the Southwest of Guanajuato that considers the installation of a greenhouse, it is worth mentioning that a test greenhouse of 700 m2 was used with an irrigation system By dripping, with capacity of 2000 plants of tomato saladette, placed in 8 rows with the use of a variety of fertilization.

Figure 1 Greenhouse

The fixed investment budget considered for the project size amounts to $ 208,877.90. Contemplating in this investment the cost of equipment and facilities for both the production and marketing of tomato saladette. Table 1 shows the cost of the equipment and the working capital required for the execution of the project. It should be mentioned that the cost of the Greenhouse considers the economic support provided by the Agency for Services to the Marketing and Development of Agricultural Markets (ASERCA).

Fixed investment budget			
Concept	Quantity	Unit cost	Total
Pruning shears	2	$168.00	$336.00
Boxes	100	$60.00	$6,000.00
25 kg scale	1	$1,041.90	$1,041.90
Greenhouse of 700 m2	1	$171,500.00	$171,500.00
Irrigation system for greenhouse of 700 m2	1	$30,000.00	$30,000.00
Total inversión			$208,877.90

Table 1 Fixed investment budget *Source: Own*

The information on projected income statements is shown in Table 2. Note the gradual increase in the profit for the year.

Statements of projected results			
Concept	Year 1	Year 2	Year 3
Sales	$118,605.60	$124,535.88	$130,762.67
Production cost	$59,302.80	$62,267.94	$65,381.34
Depreciation	$41,775.58	$41,775.58	$41,775.58
Financial expenses	$0.00	$0.00	$0.00
Total spends	$101,078.38	$104,043.52	$107,156.92
Utility before tax	$17,527.22	$20,492.36	$23,605.75
Tax	$4,907.62	$5,737.86	$6,609.61
Net profit	$12,619.60	$14,754.50	$16,996.14
Accumulated utility	$12,619.60	$27,374.10	$44,370.24

Table 2 Statement of projected results for a projection horizon of five years *Source: Own*

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Statements of projected results		
Concept	Year 4	Year 5
Sales	$137,300.81	$144,165.85
Production cost	$68,650.40	$72,082.92
Depreciation	$41,775.58	$41,775.58
Financial expenses	$0.00	$0.00
Total spends	$110,425.98	$113,858.50
Utility before tax	$26,874.83	$30,307.35
Tax	$7,524.95	$8,486.06
Net profit	$19,349.88	$21,821.29
Accumulated utility	$63,720.12	$85,541.41

Table 2 Statement of projected results for a projection horizon of five years (cont.) *Source: Own*

Table 3 shows the projected cash flows. The cash flow of year 0 (zero) should be understood as the cash flow corresponding to the year in which the management and obtaining of the financing for the project is carried out and its application in the obtaining of fixed investment necessary for the implementation of the same.

Note the positive cash flows obtained since year 1 of the project.

Cash flow			
Concept	Year 0	Year 1	Year 2
Initial balance of cash	$208,877.90	$0.00	$17,527.22
Operating inputs:			
Sales income	$0.00	$118,605.60	$124,535.88
Cash available	$208,877.90	$118,605.60	$142,063.10
Departures of operation			
Production cost	$0.00	$59,302.80	$62,267.94
Total departures of operation	$0.00	$59,302.80	$62,267.94
Extraordinary departures			
Investment in assets	$208,877.90	$0.00	$0.00
Total outputs	$208,877.90	$59,302.80	$62,267.94
Outstanding or missing cash	$0.00	$59,302.80	$79,795.16
Financing required	$0.00	$0.00	$0.00
Payments to capital (assets fixed)	$0.00	$41,775.58	$41,775.58
Payments of interest	$0.00	$0.00	$0.00
Inputs or financial outlets	$0.00	$41,775.58	$41,775.58
Final balance of cash	$0.00	$17,527.22	$38,019.58

Table 3 Projected Cash Flows *Source: Own*

Cash flow			
Concept	Year 3	Year 4	Year 5
Initial balance of cash	$38,019.58	$61,625.33	$88,500.16
Operating inputs:			
Sales income	$130,762.67	$137,300.81	$144,165.85
Cash available	$168,782.25	$198,926.14	$232,666.01
Departures of operation			
Production cost	$65,381.34	$68,650.40	$72,082.92
Total departures of operation	$65,381.34	$68,650.40	$72,082.92
Extraordinary departures			
Investment in assets	$0.00	$0.00	$0.00
Total outputs	$65,381.34	$68,650.40	$72,082.92
Outstanding or missing cash	$103,400.91	$130,275.74	$160,583.09
Financing required	$0.00	$0.00	$0.00
Payments to capital (assets fixed)	$41,775.58	$41,775.58	$41,775.58
Payments of interest	$0.00	$0.00	$0.00
Inputs or financial outlets	$41,775.58	$41,775.58	$41,775.58
Final balance of cash	$61,625.33	$88,500.16	$118,807.51

Table 3 Projected Cash Flows (cont.) *Source: Own*

Table 4 presents the results obtained in the main profitability indicators of the project. A minimum acceptable rate of return (TREMA) of 15% was considered for the purposes of the financial evaluation.

With this benchmark, an Internal Rate of Return (TIR) of 16.52% was obtained. As for the break-even point, the result obtained is justified by the absence of fixed costs in the project.

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Summary of profitability indicators	
Acceptable minimum rate of return trema	15%
Internal rate of return irr	16.52%
Economic break-even point	$2.00
Term of recovery of the investment	4 años
Net present value npv	$216,729.50
Cost benefit relation	2

Table 4 Financial evaluation of the project *Source: Own*

Conclusions

The production area of tomato saladette greenhouse in Mexico is still very small, although as it has been shown, it is increasing year by year. The profitability demonstrated by the economic evaluation of the project that is the subject of this research turns the production of tomato saladette into greenhouse conditions into a viable economic alternative for farmers.

This could improve the conditions of farmer since according to the Economic Commission for Latin America (ECLAC) in Mexico there are 4 million 331 thousand households dedicated to agricultural production and of these half live in extreme poverty, so conduct a research, Allows to learn new knowledge in different areas, so that this process allows solving a problem or expanding knowledge, having already the opportunity to develop a different production of open skies, such as harvesting in greenhouse. It is very important to evaluate its advantages and disadvantages of this process.

The lack of knowledge about the existence of economic support provided to the agroindustrial sector, has caused that the farmers do not include technology in their methods of production of tomato saladette.

Therefore, based on the results presented on the profitability and recovery period of the investment of this project, it is considered necessary to increase the information of the benefits of the governmental support programs towards the sector.

For the financial evaluation of this project a production in a semi-automated greenhouse was considered. The expenses were considered in the amount of fixed investment, considering the machinery and equipment that could be used in the process. Therefore it is open the possibility of evaluating this project in different levels of tecnification and with different products and by-products derived from the tomato saladette

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