Pan-American Agricultural School, Zamorano

Agribusiness Management Department

Agribusiness Managment

Special Graduation Project

Writing of the case study "Ema´s Farm - Business Feasibility"

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Abstract

Financial valuation is one of the most important activities in the implementation of investment projects. It is essential that managers know the applicability of different financial tools, in order to be able to make the best investment decisions based on the determination of the performance potential of the evaluated project.

The objective of this document is to create a case study as a pedagogical tool to be used by the students of the Department of Agribusiness Administration of Zamorano and of business schools in the region, in an advanced finance class.

A case study is based on real management situations, positioning the user of the case in the perspective of the decision maker and the chronological context in which the decision was made. So that it can make a decision based on the information available and the uncertainty factors present in business reality.

The present case study was created on the basis of the implementation of a new strategic business unit of Grupo Graz, dedicated to the production of organic onion in the region of the Guatemalan dry corridor.

The structure of the case allows a financial analysis for organic vegetable production projects in the region, through the calculation of Project cash flows and apply capital budgeting techniques for an investment analysis, using the WACC methodology.

Key Words: Organic agriculture, Case studies, Financial analysis.

Resumen

La valuación financiera es una de las actividades más importantes en la implementación de proyectos de inversión. Es fundamental que los gerentes conozcan la aplicabilidad de diferentes herramientas financieras, con el objetivo de poder tomar las mejores decisiones de inversión en base a la determinación del potencial de rendimiento del proyecto evaluado.

El presente documento tiene como objetivo la creación de un estudio de caso, como herramienta pedagógica para ser utilizada por los estudiantes del Departamento de Administración de Agronegocios de Zamorano y de escuelas de negocios en la región, en una clase de finanzas avanzadas.

Un estudio de caso se basa en situaciones de gestión real, posicionando al usuario del caso en la perspectiva del tomador de decisiones, el contexto cronológico en el cual se tomó la decisión. Para que este pueda tomar una decisión basada en la información disponible y los factores de incertidumbre presentes en la realidad empresarial.

El presente estudio de caso fue creado tomando como base la implementación de una nueva unidad estratégica de negocios de Grupo Graz, dedicada a la producción de cebolla orgánica en la región del corredor seco guatemalteco.

La estructura del caso permite realizar un análisis financiero para proyectos de producción de vegetales orgánicos en la región, por medio del cálculo de Flujos de efectivo proyectados y la aplicación de técnicas de evaluación financiera por medio de la metodología WACC.

Palabras clave: Agricultura orgánica, Estudio de caso, Análisis Financiera.

Introduction

Capital investment is one of the key activities in the management of any business scheme. Any asset can be valued, however; the method, the required information, the uncertainty, and the associated difficulty varies depending on the asset. The value of an asset is given by the price of the asset and the projection of future cash flows generated because of the investment.

The implementation of a project within a company is based on the principle of autonomy, and it can be evaluated based on different approaches. Being the discount cash flow valuation, the method on which the most approaches are based and the most widely used in the business environment. (Harvard Business Review, 2012)

The investment decision in a project is driven by the risk associated with different aspects of the environment, in which the investment project is being developed, as market, social, commercial, political, economic, strategic, and accounting factors. Directly affected by the perception of the analyst and the approach on which the evaluation is taking place.

The fundamental principle of corporate finance is based on maximizing the value of the company. By investing in assets that return a larger margin than the minimum acceptable discount rate, determined by the risk associated with the execution of the project and the financial leverage structure of the company. (Damodaran, 2002)

The objective of this document is to create a pedagogical instrument, on the applicability of the main tools involved in project evaluation, as part of business investment decisions. Therefore, a case study was created, based on the implementation of an organic onion production project, located in the department of Zacapa Guatemala.

This project aims to change the Subsistence farming scheme that characterizes the inhabitants of Guatemala's dry corridor, by an agro-ecosystem of organic production, and promote responsible consumption in the region by the brand Ema´s Farm.

“A teaching case is analogously, a package of snapshots that show a real management situation. Allowing students to analyze a problem from the decision-maker's perspective in the organization.” (Rotterdam School of Management [RMS], 2016)

Through a case study, it is possible to improve organizational knowledge, analyzing real problems. With the aim of transmit lessons learned through narrated and contextualized situations, to introduce experiences and courses of action, a case study does not have a closed answer. Otherwise, it allows the analyst to generate a decision, based on the information presented in the case by examining the facts from the decision-maker's point of view. (Aeronautics and Space Administration [NASA], 2008)

A case study aims to present as much information as possible in order to place the student in the management position similar to the events that occurred in the business reality. In this way without extensive work experience, all students subjected to this methodology will have the opportunity to solve the real management situation from different perspectives. The case methodology seeks a balance between a teacher-led class and the spontaneity generated by students.

The use of case methodology allows students to generate learning at multiple levels through discussion and interaction between colleagues, through self-observation and reflection. Generated as a key component in resolving a case study. (Harvard Business School [HBR], 2021)

The use of the Ema's Farm- Business Feasibility case, will allow students from the Department of Agribusiness Administration at Zamorano, to carry out firsthand the feasibility analysis for an organic agricultural project in Guatemala. Considering the main aspects to be evaluated in an investment decision for the Central American business environment.

The proposed methodology for the financial analysis is based on the calculation of the project's discount rate, under the assumptions established to determine the Weighted Average Cost of Capital (WACC), using the Capital Asset Pricing Model methodology (CAPM). This methodology will sensitize the project to the commercial conditions of the region, obtaining realistic values, based on which the relevant decisions will be made to ensure the good execution of the project.

Methodology

The case study was written under NASA's methodology, adapted to the publication guidelines of Ivey Business School. Writing a case is a methodological process, guided under established guidelines and times. A case study incorporates field experience, human and technician components. The process of formulating case studies is described below under the methodology proposed by NASA (2008).

Pick a Target

Initially, the topic on which this case was written was defined. At this stage were defined the main elements on which the case developed.

The main problem was the need to know the financial viability of the organic onion production project of the new strategic business unit of Graz Group. The decision-maker and his role in the evaluated activity were defined, which is fundamental throughout the context of the case study.

Define the Parameters of the Case

The learning objectives were set around the management experience, which was used as a learning opportunity for the users of the case study.

In view of the fact that the host company wanted to highlight the use and applicability of the WACC methodology, for the evaluation of its future investments. It was established as a general objective: To make known the applicability of the process through which a financial evaluation of an investment project is carried out and the various tools used for analysis.

Background Research

The third stage consisted of background research, this stage was fundamental, because in order to build a solid case study, it is necessary to seek as much information as possible.

The research aimed to understand the costs associated with the organic onion production process, based on primary information, resulting from a pilot production project carried out at the farm during 2020 by the research team of Graz Group. In addition to this, an investigation of Guatemala's economic and commercial environment was necessary, in order to understand the competitiveness of the firm in the national context.

Interview Key Players

At this stage, interviews were carried out with the staff involved in the evaluated project. Being the CEO, CFO, Agricultural Manager, Agricultural Project Developer, and field Staff of Graz Group. These interviews allowed contextualizing firsthand the environment under which the central problem addressed by the case was developed. These interviews were conducted personally and are confidential, according to the policy agreement established with the host company.

Evaluate Story Lines for Learning Points

At this point, a general review of the information gathered in the investigation and in the interviews was carried out, to realign the central points to be exposed in the case and to clarify what information to transmit. Respecting in the first instance the interests of the stakeholders. It is important to consider that in many occasions, it is possible to draw more than one case from a management situation, but maintaining the approach is essential to guarantee a case of quality, assailable, and functional for users.

Draft the Case into a Narrative

The first draft of the case study was made, in which it joined all the material collected up to this point. It is necessary to consider that it is crucial that the case study has a structure that contains the main character that fulfills the role of the decision maker in the institution. This was done in this way, to ensure that the user of the case evaluates the project under the same aspects used by the protagonist of the case in the real experience.

It is essential to include the plot of the story to maintain constant interest in the reader and ensure the hooking factor, by adding an element of suspense. So that in this way the reader can analyze the case from a personalist perspective, following the thread of the case backed by the tension factor to solve the key question within a certain period.

The structure of the case study narrative includes the beginning, in which the key problem of the case was developed, and the decision question was clearly defined.

The body is constituted by the story thoroughly positioning the reader chronologically at the beginning of the problem. Technical and financial information was also added, reinforcing the stress component by guiding the resolution of the case towards the expected courses of action.

The closing section, aimed to return to the problem raised in the opening section, but now with all the information and views of the key players. Necessary to be able to carry out an analysis of the case, the case was closed with the summary of the situation ending with the key questions that need to be answered by the user in the analysis of the material.

After finishing writing the draft, the formatting adjustments were made and defined as internal use material for review prior to being implemented in the test stage. Five reviews of the draft were carried out.

Circulate the Draft

The draft was submitted to three revisions by: the Graz Group Board of Directors, the advisors to the writing process, and by an editor. The reviews were conducted remotely. It is important to consider this document was socialized in confidential format for internal use.

Test the Case with a Local Audience

A test was conducted with a group of students from Agribusiness Administration Department of the Pan American Agricultural School Zamorano, which was resolved by a professor associated with the department with supervision of the main author of the case.

Teaching Note

The teaching note is vital, as a complement to the case study. This works as a support for the teacher who guides the resolution of the case study. The establishment of the teaching sheet was carried out simultaneously with the writing of the whole case, this includes a synopsis of the case, the teaching objectives, the objective audience, and the position of the case in the course, literature related to the theme developed, the assignment questions, the teaching plan, the resolution of the case and the epilogue.

The case was approved by the host company, and by the special graduation project advisor associated with the agribusiness Department of the Pan American Agricultural School Zamorano, it is also in the process of being published by Richard Ivey businesses school.

Results and Discussion

The writing of the document was done according to the guidelines of the Case Study Methodology, of the National Aeronautics and Space Administration (NASA), adapted to the case publishing requirements of Richard Ivey Business School. This case provides participants with an opportunity to calculate initial investment, develop project cash flows, and apply capital budgeting techniques for an investment analysis, with special emphasis in the WACC methodology.

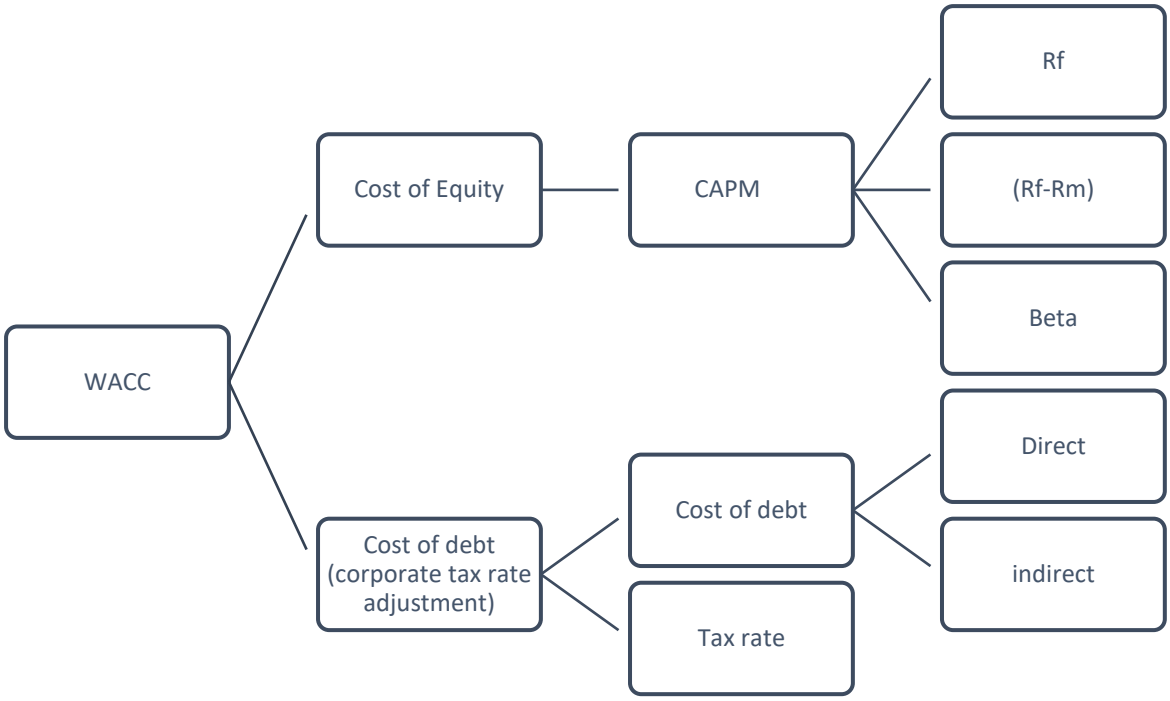
The case structure considers the main aspects taken into consideration in the financial evaluations of agricultural projects in the Latin America region. The case study is structured with the aim of being able to carry out an investment valuation using discounted cash flow analyses.

This analysis is based on the projection of discounted cash flows through the capital cost rate. Defined as a weighted average of the cost of equity and debt, (weighted average cost of capital WACC). Most financial analysts use the capital asset pricing model CAPM, to determine the cost of equity, which sets the return required by an investment associated with the level of risk affecting the project (Damodaran, 2002).

The case resolution allows students to conduct a financial evaluation by the discounted flows method. The case provides the necessary components for the calculation of the discount rate using the WACC methodology, and the CAPM methodology. Figure 1 shows the disgloce of the teaching blocks that can be demonstrated by the resolution of the case.

Figure 1

Learning blocks developed in the case study.



It is essential to emphasize that the case is structured with specific objectives, on which it is recommended to be used. It may be possible to use it to develop other related topics due to its nature. However, the case author recommends using it for financial feasibility assessments and the use of the WACC as the discount rate for investment evaluations.

The case study is complemented by the teaching note, which is used exclusively for the teacher who is guiding the case. This allows the teachers to create the action paths to develop the case. The teaching note will be provided through the Wilson Popenoe Library. Under the respective confidentiality requirements.

Due to the formatting requirements under which the case was written, in order to maintain the main purpose of the document. And respecting the guidelines requested by the entity under

which the case will be published. The case and the teaching note are presented in the exhibit section. **See appendix A.**

Conclusions

The case study Ema's Farm- Business Feasibility was written. The case study is of a financial nature and is structured to be used as a pedagogical tool, in business schools in the Latin American region. The knowledge blocks implicit in the case, allow the users of the case to develop multiple criteria in the analysis of agricultural production projects through tools as projected cash flows and the calculation of the discount rate using the WACC methodology.

Recommendations

It is recommended that the case be used as a tool that allows knowledge of the multiple quantitative and qualitative implications that affect the execution and economic feasibility of an organic plant production project.

Develop an extension of the case in which probabilistic variables are included with the aim of sensitizing the analysis, with the use of risk analysis software.Complement the case with audiovisual material from Graz Group, with the aim of improving the perception of the users of the case and placing them firsthand in the role of the decision maker in the institution.

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Appendices

Appendix A

Case study Ema´s Farm: Business Feasibility.

Department of Agribusiness Administration

Pan-American Agricultural School, Zamorano.

Ema´s Farm: Business Feasibility

Eng.Tulio Ordoñez was lying on the chair of the head office of Ema´s Farm, considering the implementation of an organic onion production project in the guatemalan dry corridor region, one afternoon in November 2020, after a field visit with the company's administrative staff. Eng. Ordoñez, a recent graduate of the Department of Agro-Business of the Pan American Agricultural School, Zamorano, was assigned as developer of agricultural projects for the new strategic business unit BSU of the Graz Group.

With the aim of boosting vegetable consumption and the development of organic agriculture in Guatemala. The Board of Directors raised the development of a new BSU, dedicated to the production of NOP-USDA certified organic vegetables, through the Ema's Farm® brand.

Eng. Ordoñez had to present a feasibility analysis of the project, at the next meeting of the board of directors, held in the last quarter of the year. Which would discuss the strategic plan 2021-2026, where the new crops would be established in order to introduce them into the annual organic certification program.

This analysis would define the course of action for the agricultural division of Graz Group in the following operational period. The decision needed to be carried out urgently, since a delay would represent another year until they would be able to accredit the production areas under the NOP-USDA organic certification, which guarantees the traceability of the company's products.

Background

Ema´s Farm, is the research center for agriculture, forestry and biodiversity of Graz Group. For the past 5 years, this company has been strongly dedicated to the development of technologies associated with organic plant production and mineral fertilization.

The farm is located in the village El Chico, in the municipality of Usumatlán, Zacapa, Guatemala. It has more than 250 ha of forest protection; a program of recovery, reproduction and relocation of Orchids and Tillands from forest harvests, a clonal cocoa garden and organic production lots of fruit trees. In

addition to this, the farm has a mining license for the extraction of Jadeite, Quartz and Serpentine, under an environmental low-impact scheme.

Ema's Farm was created with the aim of boosting local production of organic vegetables. Due to the micro topographical conditions of the farm, it was possible to take advantage of various agricultural areas of small extension (less than 2 ha), scattered throughout the property. Ema´s Farm works under an intensive organic production scheme, in which plant production programs are developed for the supply of gourmet restaurants and retail stores nationwide, serving a market segment with high purchasing power.

The new BSU will allow the involvement of the villagers of El Chico village, and will provide training workshops on agricultural technologies used in the production project, as part of the knowledge dissemination program of Graz Group. This program aims to improve the quality of life of the farm collaborators by empowering them to diversify their diets including organic vegetables to a diet characterized mostly by corn, and beans.

Guatemala's economic situation

In 2020, even though the severe contraction caused by the Covid 19 pandemic, and the measures related to the preservation of health in the country, Guatemala was reported as the largest economy in Central America; with a gross domestic product of US $74,078 million. [1]

The consumer price index CPI, shows a relatively stable pace with a decrease in 2020, due to contingency measures in the face of the Covid 19 pandemic and the reduction in oil prices. However, the value of the CPI expressed as a percentage is expected to rise to 3.2% at the end of the year when domestic demand is recovered. Exhibit 1 presents the price history of the CPI in Guatemala.[2]

Guatemala has shown constant but moderate economic growth, with an average growth rate of 3.5%, the country has experienced economic stability largely, attributed to the inflation targets proposed by the Central Bank (BANGUAT). Historically the country has presented an exchange rate against the dollar relatively stable, with historical value of 3.84%.[3]

Due to the effects of the Covid-19 pandemic, a slight depreciation of quetzal is expected in the period 2020-2024, however, the level of foreign investment is not affected due to the low relationship between quetzal and financial markets and to the country's high foreign exchange reserves (19.3% of GDP in 2019).[4]

The credit rating for Guatemala according to Standard &Poor's is BB- with a stable outlook, according to Moody's this one is located in Ba1 with a negative outlook, and Fitch reports a BB- rating with a stable outlook.[5]

Agriculture in Guatemala

Guatemalan agriculture is characterized by the climatic differences associated with high geographical variability throughout the country; it is possible to distinguish four main regions throughout the country. The highlands are located between the Sierra Madre and the Cuchumatanes mountain range. In

[1] United States Agency for International Development. 2017. “Analytical Brief Agriculture in Guatemala.” https://www.climatelinks.org/resources/analytical-brief-agriculture-guatemala
[2] Economist Intelligence Unit (2020)
[3] The World Bank Group. 2021. “GDP Growth (Annual %) - Guatemala.” https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG.

[4] Food and Agriculture Organization of the United Nations. 2020a. “FAOSTAT Statistical Database.” Accessed April 26, 2021. http://www.fao.org/faostat/en/#data/QC.
[5] Trading Economics. 2021. “Guatemala - Credit Rating.” https://tradingeconomics.com/guatemala/rating

reference to the lowlands of Guatemala; we can categorize them in three regions, the Boca Costa, located along the Pacific Ocean. The Northern Transverse, characterized by its extensive forest use and extensive crops such as the oil palm. And the Dry Corridor, located from central Guatemala in the direction of the southeast of the country, strongly associated with malnutrition and poverty conditions.

Agriculture is one of the most important economic activities in Guatemala; it is strongly related to unemployment and food safety. One in three Guatemalans is employed in agriculture, the International Labour Organization reports that the agricultural sector contributes 34% to total employment in Guatemala. The contribution of agriculture in national employment decreased by 7%, however, the number of people employed in agriculture increased by 29.5% in the period 2000-2016. Agricultural value added has increased by 13.9 percentage points in 2006-2015. [6]

According to the Food and Agriculture Organization, FAO, the area used for agricultural purposes accounts for 34.5% of Guatemala's total area, equivalent to 3.8 million ha. The agricultural area is composed of arable land, permanent crops, grasslands and meadows. Agricultural crops account for 28% of the total agricultural area, with the main driver being the tendency to export fruits and vegetables. Organic production is an area that has shown an incremental trend since 2005. According to the Ministry of Livestock Agriculture and Food MAGA in 2014, 940000 ha were earmarked for organic exploitation, of which less than 1% was used.[7]

Conventional agriculture makes intensive use of agricultural inputs, in search of a rise in productivity. In the period 2002-2014, there was a 170% increase in the use of synthetic fertilizers, quantified in kg/ha of arable land. There was also a 112% increase in pesticide use and a 101% increase in herbicide use, measured in commercial value in the period 2000-2013. [8]

Guatemala has a strategic plan for organic agricultural production in the country, with the aim of increasing productivity, greater market access and improvements in the institutional sector. The organic agricultural sector faces strong challenges, such as access to seeds and organic genetic material, soil degradation and fertility, expertise in integrated pest management, and development of technologies in intensive organic production.[9]

Access to agricultural financing is one of the main constraints in terms of improvements in technology and national productivity. These difficulties are strongly influenced by political instability, corruption, and high agricultural credit interest rates, so development in the sector is severely limited. [10]

Agricultural production in Guatemala is a fundamental pillar in the country's economy, even though this sector is not the main component of GDP, it contributes greatly to employment generation and food security in the country, particularly benefiting the most vulnerable population.

Ema's Farm will allow Graz Group to take advantage of its vast experience in the production of organic vegetables and the ease of access to organic raw materials by having another BSU, (Zeolitas de Guatemala) responsible for the supply of mineral fertilizers in the country.

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[6] United States Agency for International Development. 2017. “Analytical Brief Agriculture in Guatemala.” https://www.climatelinks.org/resources/analytical-brief-agriculture-guatemala

[77] Food and Agriculture Organization of the United Nations (FAO) (2020a); United States Agency for International Development (USAID) (2017)

[8] United States Agency for International Development. 2017. “Analytical Brief Agriculture in Guatemala.” https://www.climatelinks.org/resources/analytical-brief-agriculture-guatemala

[9] Edith Vasquez. 2015. “Organic Products Growth Potential in Guatemala.” GT-1506. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=New%20opportunities%20for%20organic%20agriculture_Guatemala_Guatemala_6-12-2015.pdf.

[10] Edith Vasquez. 2015. “Organic Products Growth Potential in Guatemala.” GT-1506. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=New%20opportunities%20for%20organic%20agriculture_Guatemala_Guatemala_6-12-2015.pdf.

The feasibility of implementing the project was supported by technical, strategic, and market studies carried out during 2020, with the technical advice of Ph.D. Hugo Ramírez, expert in organic horticultural production and the company's market team.

Mr. Castañeda CEO of Grupo Graz believes strongly in the execution of the organic onion production project, he says:

> **"**Organic agriculture is a completely different world from conventional production, however, experience, technology and the market prices make the execution of the project attractive. Generating also multiple contributions such as improving the quality of life of employees through the socialization of technology, the generation of employment, and the reduction of pressure to the environment through a sustainable production scheme."[11]

Onion Production

Onion production is distributed worldwide. With a production of more than 20 million tons per year, China is the main producer, followed by India, the United States and Turkey respectively. The production of onions in the region is characterized by two production cycles, with late onions (cycles of more than 120 days) and early onions (cycles of 90-120 days). The main features that govern the development and productivity of the onion are the photoperiod and the temperature of the site in which they are grown.[12]

These differences in production cycles cause seasonality of markets, creating a market opportunity, to meet demand in periods when supply declines at the national level. By growing resistant varieties and adding value through market certifications, it is possible to obtain better profit margins.

Guatemala has a conventionally operated onion production form more than 5 thousand hectares, equivalent to 152,300 Kg of dried onion, showing a moderate but steady rate of growth. In reference to organic production, there are currently no records. Represented only by family farmers without any certification or accreditation that validates the traceability of the crop.[13]

The shortages of companies dedicated to the production of organic vegetables, is a clear window of opportunity to meet the demand for organic onion in Guatemala. Gourmet restaurants and supermarkets, serving a segment of high purchasing power costumers, mainly characterize the target market of Ema's Farm. The growing demand for organic products, as an alternative for healthier, more environmentally friendly food, drives the vegetable production scheme to meet the demand of the domestic market.[14]

Market for onions

The Guatemalan market prefers white onions to yellow and purple onions. The onions can be commercialized in two ways, fresh with stem, or dried without stem. Showing variations in preference between the different regions of the country. However, dry onions have a longer shelf life, so it generally has greater acceptance and demand in the domestic market.[15]

The dried onion was sold in 50-pound mesh bags. Price fluctuation varies during the year and occurs based on supply and demand, directly associated with production seasons and seasonal patterns. In

[11] Eddy Catañeda. 2020. Interview by Robert Cook. 2020. Guatemala, Guatemala.
[12] FAO (2020a)
[13] FAO (2020b)
[14] Edith Vasquez. 2015. "Organic Products Growth Potential in Guatemala." GT-1506. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=New%20opportunities%20for%20organic%20agriculture_Guatemala_Guatemala_6-12-2015.pdf.
[15] Myra Martinez. 2021. Interview by Robert Cook. March 31, 2021.

2020, the price range fluctuated between 0.32 and 1.86 USD/Kg with an average of 0.65 USD/Kg noting the highest prices in the last quarter of the year. [16]

Emas Farm sells its production to three organic supermarket franchises and a line of gourmet restaurants in Guatemala City and Antigua Guatemala. The company sets a fixed-price supply contract at a price of $1.03/lb.

Key Financial data

Eng. Ordoñez has to prepare a feasibility analysis for the production project, considering a 5-year evaluation horizon. The broad of directors asked Eng. Ordoñez to use the WACC method to assess the project. This analysis will be carried out, based on secondary research and the costs associated with the production of organic onions, using the information generated in a pilot project carried out at the farm, the previous year, as part of the technical study.

Initial investment

The first step was to select the agricultural lots to be used in the production of organic vegetables. Since the company has the land resource, it was not necessary to lease or buy land. In case of not using these lots in the project, they would be rented for the production of organic beans to another BSU of Graz Group, at a cost of 200 USD/ha per year.

After the selection of the lots, it was necessary to enable the site and prepare the soil. Due to the soil and micro-topographic conditions of the farm, a two-stage process, was carried out, depending on the classification of the lot under the land use management system established by the company. In the first stage, larger stones were manually removed and terraces were built in the areas with the highest slope, this habilitation had a cost of 300 USD/Ha.

It is necessary to take into consideration that the first stage, only occurs in sites where there has been no prior agricultural use, characterized by the presence of limiting stonyness, categorized as site C. 46.8 % of the sites to be used throughout the project are category C.

The second stage involves soil mechanization. This is carried out with the aim of promoting aeration in the cultivation beds, removing weeds, improving root development, and promote the anchoring of the plant. It consists of one plow tillage and two harrow tillage, at a depth of 0.20m, mechanized and manually respectively, using the soil conservation method; curves in the slope.

The crop beds have 1 m wide, 0.20 m height and variable length, distributed according to the in the slope of the lot. The costs associated with soil mechanization represented an amount of 4300.00 $/ha.

Irrigation

The production lots will be subjected to a drip irrigation system driven by gravity, due to the topographic and hydric characteristics of the farm. The installation of the irrigation system, was outsourced and costs represented an amount of 5000.00 $/ha.

Production process of Organic Onion in the seedling stage

Sowing

[16] Juan Clanclan. 2021. Interview by Robert Cook. April 2, 2021.

The project was implemented using white onion of the variety White Dawn®, owned by Bejo®. This is an early variety, with sparse foliage and tolerance to flowering, used in the dry season. It produces round, heavy bulbs with excellent skin quality.[17] It was sown using the jet planting method, spread over eight rows, for 1000 seeds/m2. The germination percentage was 80% according to the field tests carried out on the farm. The costs associated with planting represented an amount of 9,600.00 $/ha.

Weed control

The weed control was carried out manually, the costs associated with weed control process represented an amount of 3,400.00 $/ha.

Fertilization

The nutritional requirements of the crop were covered by the fertilization plan, based on the use of mineral fertilizers and the application of biofertilizers manufactured from a fermentation process, through efficient microorganisms and sources of nutrients such as bird manure, phosphate rock and legumes. The costs associated with fertilization were 13,500.00 $/ha.

Phytosanitary handling

A wide range of microbiological products listed by OMRI®, and endorsed by Mayacert® were used, alternated with cultural techniques such as manual control, removal of alternate hostesses, and installation of yellow traps for pest prevention and control.

Phytosanitary control varies depending on the season of year, climate and ecological balance at the site. It is advisable to consider an additional percentage of the budget earmarked for contingencies. Taking into consideration the high variability in this work, as the difficulties associated with the limiting of products endorsed for organic production, and that the mode of action of these products is preventive. Since the quality and health of the plant are fundamental parameters, to guarantee an optimal development in the field stage. The costs associated with phytosanitary control at the seedling represented an amount of 11,300.00 $/ha

Removal of seedlings from the seedbed for transfer to open field

The harvest of the seedling consists of the extraction of the plants in order to be transplanted in the open field, where they will complete the production cycle. For the conditions of the farm, this state is reached 47 days after sowing. The costs related to seedling extraction represent an amount of 1,700.00 $/per hectare of seedbed / per hectare of seedbed.

Production process of Organic Onion in the definitive field.

Transplanting

The method used was the square sow method, with a density of 80 plants/m2. This process was performed 45-50 days after planting, when the seedlings are robust vigorous, healthy and have four or five leaves with a plant length from the neck to the top of the leaves of 25 to 30 cm. The costs associated with the transplant stage are summarized in the production cycle cost table. See exhibit 5.

Soil preparation

[17] Bejo. 2020. “Cebolla White Dawn.” https://www.bejogt.com/cebolla/white-dawn-conventional.

Soil preparation for cultivation was carried out in a similar way as in the nursery stage. The costs associated with soil preparation are reflected in the cost summary table. See exhibit 5.

Irrigation

The crop is subjected to a drip irrigation system driven by gravity, with distances between drippers of 10 cm and 4 belts per groove, the irrigation lots are sectored according to the micro topographical conditions of the growing lots,. Irrigation work requires 20 working days per hectare per production cycle. The costs associated with irrigation are are reflected in the cost summary table. See exhibit 5.

Weed control.

The weed control was performed manually. The costs associated with weed removal activities are reflected in the cost summary table. See Exhibit 5

Phytosanitary handling

Phytosanitary control depends on the time of year at which the growing cycle is taking place, with significant variations influenced by the microclimates found in the different agricultural sectors of the farm. The products used in the phytosanitary management plan are listed by OMRI® and endorsed by Mayacert®. The cost associated with the phytosanitary handling are reflected in the cost summary table. See Exhibit 5.

It is essential to take into consideration that it is necessary to budget an additional amount on the total plan, intended for contingencies. Since organic phytosanitary control has wide handling implications due to product limitations endorsed by international standards.

Fertilization

The integrated fertilization plan is based on the supply of macronutrients and micronutrients to the crop, through the use of mineral fertilizers, organic matter, humic and fulvic acids and other inputs developed on the farm. The application of Nitrogen and Phosphorus, were supplied in two stages, corresponding by 60 % during the vegetative development and 40% after bulbification began. The remaining nutrients must be supplied, during different stages of the cycle, according to the interaction and development of the crop. The costs associated with the fertilization plan are presented in the summary table.[18]See Exhibit 5

Harvest

Onions suffer a two-stage production cycle, represented by a period of active growth, followed by a period of post-bulbification inactivity, characterized by the fall and death of the vegetative part of the plant. Harvesting begins when 20% of the leaves have fallen. The harvesting process begins with a surface undermining, approximately five centimeters below the bulbs, this activity will accelerate the inactive state of the plant, favoring the field drying process. The harvest is carried out manually with the use of 50-pound-capacity mesh bags, facilitating handling and allowing the initial classification in the field.[19]

During harvesting, two-thirds of the roots and vegetative part are removed, making sure to leave at least four centimeters of stem, avoiding mechanical damage or the entry of infectious agents into the bulb. It

[18] Hugo Ramirez. 2020. "Fortalecimiento De La Produccion De Cebolla Organica En Usumatlán Zacapa, Guatemala: Informe Diagnóstico Y Propuesta En El Manejo Integrado Del Cultivo Cebolla Orgánica.".
[19] Mike Boyette., D. C. Sanders, and Ed Estes. 1992. "Postharvest Cooling and Handling of Onions." https://content.ces.ncsu.edu/postharvest-cooling-and-handling-of-onions.

is essential to manage adequate supervision in the harvesting process, ensuring the quality of the product, through the application of good horticultural practices. For the farm conditions, the harvest occurs 120 days after transplanting, with average weights of 135 g/per bulb. The costs associated with the harvest are reflected in the crop cycle summary table. See Exhibit 5

Drying process

Drying is done because it guarantees a longer shelf life of the product, in addition to improving the quality of onions by preventing them from becoming infected by fungi or bacteria causing rot or mold in the bulb. Drying also prevents mechanical damage, in the process of handling at the packaging and transport stage. A bulb with the first layers and roots completely dry, and the neck of the plant completely closed characterizes a good drying process.

The process is carried out in solar dryers. For a period of 15-21 days, depending directly on the environmental conditions during the process. The cost associated with the drying are reflected in the cost summary table. See. Annex 5

Packaging

Ema's Farm commercialize its products in two presentations, 5 pounds mesh bags for retail stores, and 100 pounds mesh bags at a price of 1.03 $/lb.

Transport

For the transport of the product to the delivery location, a truck of 3.5 tons of cargo capacity is used. The costs associated with transportation amount to $ 300.00

Income

Ema's Farm sells 100% of its production to its main customers, setting the sale price through contracts. NOP-USDA certification provides the company with strong bargaining power. In addition, the long-term relationship generated with customers is satisfactory for everyone involved in the negotiations.

The decision

Graz Group considered that Ema's Farm was a project with high potential to make use of the agricultural expertise and the research developed by the company in the previous years, promoting organic agriculture and vegetable consumption in Guatemala.

To make the final decision regarding the implementation of the organic onion production project, the board needed to know the economic feasibility of the project for a five-year evaluation horizon using the WACC methodology. In addition to this, the company consulted Eng. Ordoñez; what is the most recommended financial leverage scenario for project execution?

Exhibits

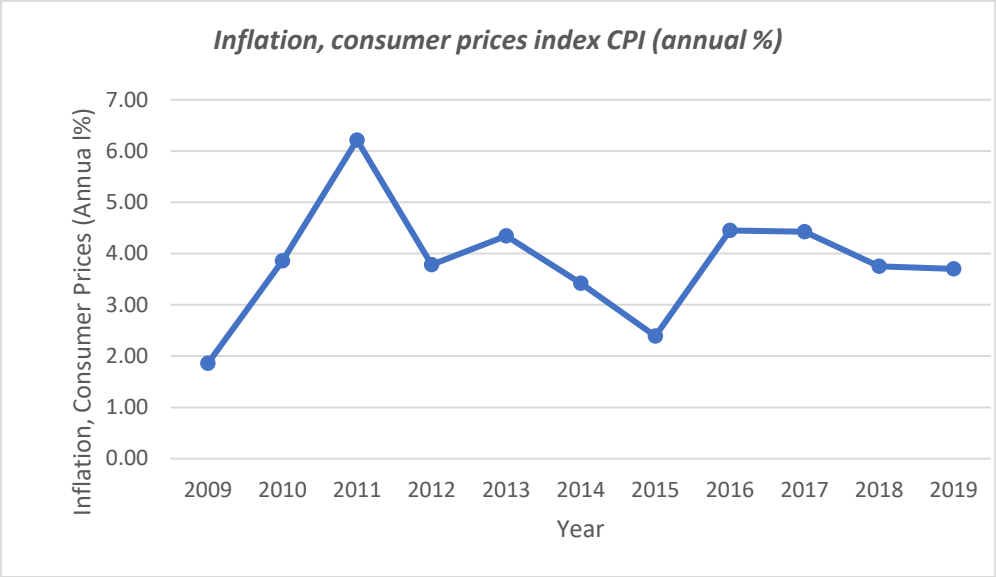

Exhibit 1 Guatemala Inflation 2009-2019 [20]

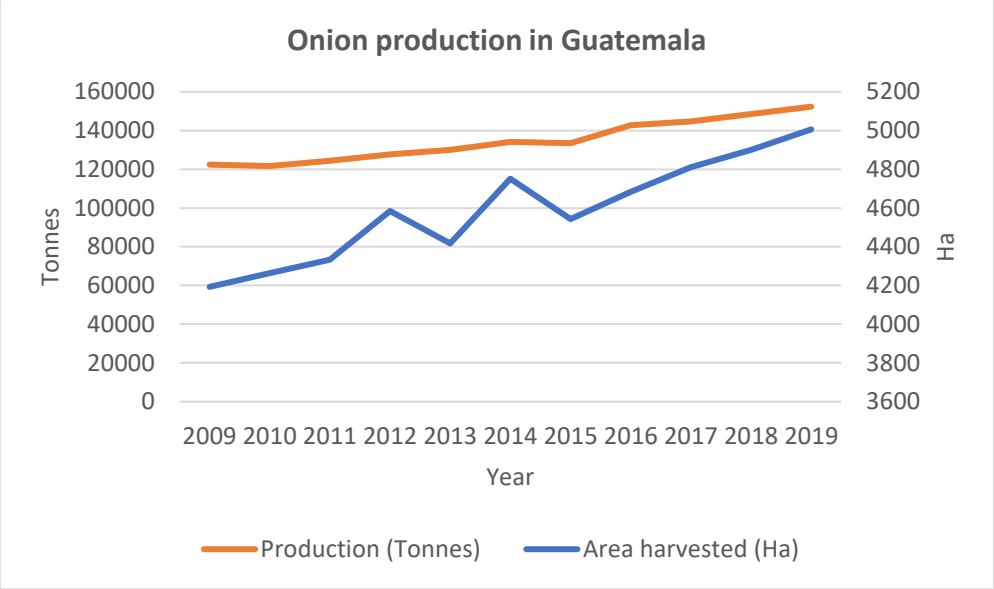

Exhibit 2 Onion production in Guatemala by harvested volume and cultured area.[21]

[20,21] FAO (2020b); The World Bank Group (2021)

Area with agricultural potential available at Ema´s Farm		
Category	**Description**	**Area(ha)**
A	Areas requiring cleaning of herbaceous weeds and soil preparation	6.8
B	Areas that require cleaning of herbaceous and shrub weeds, and soil preparation.	0.35
C	Areas requiring general weed cleaning and removal of limiting stoniness	10.67
U	Areas currently occupied by annual or perennial crops	11.8
	Total area	29.62

Exhibit 2 Land Use at Emma's Farm

Basic Assumptions for the analysis	
Guatemala	GT
Productive cycles per year (cycles)	2
Evaluation Horizon (year)	5
Inflation adjusted by exchange rate (%)	3.863%
Unlevered Beta	0.658
Tax rate (%)	5.000%
Moody´s Credit Rate for Gt	BB-
Stock volatility/bond volatility	1.50
Default risk premium	3.50%
Company default risk premium (spread)	2.00%
Debt ratio	0.60
Implied Premium (FCFE)	5.500%

Exhibit 3 Key financial data [21]

[21] Trading Economics. 2021. "Guatemala - Credit Rating." https://tradingeconomics.com/guatemala/rating.

Costs associated with the production process of organic onion			
Production costs in the seedling stage		**Production costs at the field stage**	
Activities	**Cost/ha/year**	**Activities**	**Cost/ha/year**
A. Variable costs		A. Variable costs	
1. Soil preparation	$ 4,300.00	1. Soil preparation	$ 2,999.00
2. Sowing	$ 9,600.00	2. Transplantation	$ 2,122.00
3. Weed control	$ 3,400.00	3. Weed control	$ 2,049.00
4. Fertilization	$ 13,500.00	4. Fertilization	$ 11,913.00
5. Irrigation	$ 4,600.00	5. Phytosanitary control	$ 2,462.00
6. Phytosanitary control	$ 11,300.00	6. Irrigation	$ 667.00
7. Seedling harvest	$ 1,700.00	7. Harvest	$ 1,032.00
B. Fixed Costs		8. Post-harvest	$ 1,270.00
Operational expenses	$ 800.00	B. Fixed Costs	
Total	$ 74,256.54	Operational expenses	$ 1,500.00
		Total	$ 26,016.00

Exhibit 4 Production costs of the crop cycle [23]

Initial Investment ($/ha)	
Organic Certification	$ 2,000.00
Tools and equipment	$ 600.00
Monoculture	$ 1,500.00
Irrigation system	$ 5,000.00
Car	$ 35,000.00
Dehydrated structure	$ 2,000.00
warehouse	$ 2,000.00
Total	$ 48,100.00

Exhibit 5 Initial investment

[22] Hugo Ramirez. 2020. “Fortalecimiento De La Produccion De Cebolla Organica En Usumatlán Zacapa, Guatemala: Informe Diagnóstico Y Propuesta En El Manejo Integrado Del Cultivo Cebolla Orgánica.”.

Year	2021	2022	2023	2024	2025
Land use expansion (ha)	6.80	6.02	5.00		
Total land use (ha)	6.80	12.82	17.82	17.82	17.82
Yield/ha (lb/ha/cycle)	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00

Exhibit 6 Yields and production area.

Year	CPI Gt	Exchange rate (%)	Δ Exchange rate	CPI USA (%)	Implied Premium (FCFE) (%)
2009	1.859	8.162		-0.356	5.20
2010	3.860	8.058	-0.013	1.640	6.01
2011	6.214	7.785	-0.034	3.157	5.78
2012	3.782	7.834	0.006	2.069	4.96
2013	4.343	7.857	0.003	1.465	5.78
2014	3.418	7.732	-0.016	1.622	6.12
2015	2.389	7.655	-0.010	0.119	5.69
2016	4.448	7.600	-0.007	1.262	5.08
2017	4.425	7.348	-0.033	2.130	5.96
2018	3.752	7.519	0.023	2.443	5.20
2019	3.700	7.697	0.024	1.812	4.72
Average	3.835	7.750	-0.006	1.578	5.500

Exhibit 7 Historical financial data23

[23] U.S. Department of The Treasury. 2021. “Daily Treasury Yield Curve Rates.” https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2021.

Appendix B

Teaching Note of the case Ema´s Farm: Business Feasibilit.

Ema´s Farm: Business Feasibility

Teaching note

Synopsis

Graz Group was considering the creation of a new BSU, dedicated to the production of organic vegetables under the brand, Ema´s Farm®. Eng. Tulio Ordoñez, a recent graduate of the Agribusiness Department of the Pan American Agricultural School, Zamorano. And the new developer of agricultural projects of Graz Group, needed to carry out a financial evaluation for a 5 years horizon, using the WACC methodology, and the different financial indicators used in the region (NPV, IRR, ID), proposing the best financial leverage scenario.
For the analysis the company considered a financial leverage of 60%, the tax rate for Guatemala was 5%, and the opportunity cost of the land represented a net income of USD 300/ha. The costs associated with the production of organic onions were extracted from a pilot project carried out by the company in 2019.

Potential use of the case

This case was structured for the use in a finance agribusiness course; it could be also used in an introductory finance curse in a MBA program. It provides participants with an opportunity to calculate initial investment, develop project cash flows, and apply capital budgeting techniques to evaluate the financial viability of the project with a special emphasis in the WACC methodology.

Basic knowledge of finance would be required.

Keywords

Investment, Cash Flows Viability, WACC (Weighted Average Cost of Capital).

Teaching Objectives

This case would provide students with the opportunity to:

1. Estimate cash flows of an agricultural project at different periods.
2. Apply the Weighted Average Cost of Capital (WACC) to evaluate the feasibility of a project.
3. Apply Net Present Value (NPV) and Internal Rate of Return (IRR) in a financial decision to accept or reject a business opportunity
4. Evaluate the qualitative variables of an organic agricultural project in tropical regions and the influence of them in the feasibility
5.

Suggested additional Reading

The following reading is recommended for the resolution of the case study, with the aim of improving the most common bud**geting** techniques, to evaluate capital investments in the Latin America Region.

David Hourse (2008). Note on evaluating capital investments. Ivey Managment Services, Article 908B12.

The following reading allows a concise understanding of the WACC method, as a tool for the financial evaluation of investment projects.

Damodaran, Aswath. 2002. Investment Valuation: Tools and Techniques for Determining the Value of Any Asset. 2nd university ed. Wiley finance. New York, Chichester: Wiley.

Suggested assigment questions

Q1. Based on the information provided by the case, calculate the initial and accumulative investment necessary for the implementation of the organic production project, taking into consideration the increase in area proposed by the technical and market study, carried out by the company.

Q2. Estimate project cash flow, from year 1 to 5. Assume that cash flows occur at the end of each year to facilitate analysis.

Q3. Determine the cost of equity using the CAPM methodology.

Q4. Calculate the cost of capital using the WACC methodology, based on the information provided by the case and Damodaran Online databases.

Q5. Determine the Internal Rate of Return (IRR), and the Net Present Value (NPV) of the project.

Q6. If you were in the position of Eng. Ordoñez, would you recommend accepting the implementation of the project? Moreover, what proportion of financial leverage would be the most recommended?

Suggested class plan

1. Identify the costs associated with the organic onion production process, determining the main components of the initial and cumulative investment, for the 5-year evaluation horizon.	10 min
2. Calculate the weigthed average cost of capital WACC for the project	25 min
3. Estimate the operational cash flows of the project	15 min
4. Determine the internal rate of return and net present value of the investment project	10 min
5. How sensitive is the NPV of the project, as the main variables involved in the analysis vary (prices, production volumes)	15 min
6. If you were in the position of Eng. Ordoñez, would you recommend accepting the implementation of the project? Moreover, what proportion of financial leverage would be the most recommended?	15 min
	90 min

Case discussion and analysis

Q1. Based on the information provided by the case, calculate the initial and cumulative investment necessary for the implementation of the organic production project, taking into consideration the increase in area proposed by the technical and market study, carried out by the company.

The initial investment consists of the assets listed below, it is necessary to emphasize that given the plans of gradual expansion of the production area, it is necessary to make additional investments in each year.

Year	Column1	Time 0	2021	2022	2023	2024	2025
Years of the project		0	1	2	3	4	5
Area of cultivation			6.80	12.82	17.82	17.82	17.82
Organic Certification	2,000		13,600	26,630	38,447	39,932	41,474
Tools and equipment	600		4,080	7,989	11,534	11,980	12,442
Monoculture	1,500.00	3,116	3,236	3,361	0	0	
Irrigation system	9,000	61,200	119,837	173,010	179,694	186,635	0
Car	35,000	35,000	0	0	0	0	0
Dehydrated structure	2,000	13,600	26,630	38,447	39,932	0	0
Warehouse	2,000	13,600	12,040	10,000	0	0	0
Total Investment		126,516	165,824	232,807	231,160	198,615	12,442
Working Capital		250,976	240,466	218,058	27,408	28,467	-765,374

Q2. Estimate project cash flows from year 1 to 5; assume that cash flows occur at the end of each year to facilitate calculations.

For the estimation of Cash Flows it was used the following information

Year	2021	2022	2023	2024	2025
Land use expansion (ha)	6.80	6.02	5.00		
Total area for agricultural use (ha)	6.80	12.82	17.82	17.82	17.82

Basic Assumptions

Basic Asumptios for the analysis	
Area for the production of organic vegetables (ha)	6.80
Productive cycles per year (cycles)	1
Inflation rate Gt(%)	3.84%
Evaluation horizon (year)	5
Guatemala	GT
Bond rate	BB-
Default Risk Premium	0.04
Stock Volatility/Bond Volatility	1.50
Inlfacion ajustada por tipo de cambio	3.86%
Tax	5%

Income

Year	2021	2022	2023	2024	2025
Years for price adjestment	1	2	3	4	5
Selling price	1.03	1.03	1.03	1.03	1.03
Price adjustment over time	1.07	1.11	1.15	1.20	1.25
Yields (Lb/Ha)	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00
Harvested area	6.80	12.82	17.82	17.82	17.82
Production (kg)	408,000.00	769,200.00	1,069,200.00	1,069,200.00	1,069,200.00
Income	436,760.05	855,229.80	1,234,705.26	1,282,401.75	1,331,940.74

Variable costs

Year	2021	2022	2023	2024	2025
Years for price adjestment	1	2	3	4	5
Costs adjustment over time					
Variables costs in the Seedling stage	73,456.54	73,456.54	73,456.54	73,456.54	73,456.54
Variables costs in the Field stage	24,516.99	24,516.99	24,516.99	24,516.99	24,516.99
Adjudment Variables costs in the Seedling stage	76,294.15	79,241.38	82,302.47	85,481.80	88,783.95
Adjudment Variables costs in the Field stage	25,464.08	26,447.76	27,469.43	28,530.57	29,632.70
Production Aera (Field stage) (ha)	6.80	12.82	17.82	17.82	17.82
Production Area (Seedling stage) (ha)	1.02	1.92	2.67	2.67	2.67
Total seedgling stage	77,820.03	152,381.18	219,994.49	228,492.85	237,319.49
Total field stage	173,155.76	339,060.23	489,505.21	508,414.73	528,054.72
Total	250,975.79	491,441.40	709,499.71	736,907.58	765,374.21

Fixed costs

Year	2021	2022	2023	2024	2025
Years for price adjestment	1	2	3	4	5
Fixed costs at the seedling stage	800.00	800.00	800.00	800.00	800.00
Fixed costs at the field stage	1500.00	1500.00	1500.00	1500.00	1500.00
Adjustment of the fixed costs at the seedling stage	830.90	863.00	896.34	930.96	966.93
Adjustment of the fixed costs at the field stage	1557.94	1618.13	1680.64	1745.56	1812.99
Area of cultivation	6.8	12.82	17.82	17.82	17.82
Total fixed costs	2,388.85	2,481.13	2,576.98	2,676.52	2,779.92

Other expense

Years of the project	2021	2022	2023	2024	2025
Production area					
	6.80	12.82	17.82	17.82	17.82
Income	436,760.05	855,229.80	1,234,705.26	1,282,401.75	1,331,940.74
Organic Certification	13,600.00	26,630.47	38,446.72	39,931.91	41,474.48
Sales expenses	8,735.20	17,104.60	24,694.11	25,648.03	26,638.81
Administrative expenses	3,795.48	4,974.72	6,984.22	6,934.79	5,958.44
Operative expenses (Leasing de la tierra)	4,428.85	6,327.13	7,922.98	8,022.52	8,125.92
Total (Sales + Operative+ Administrative)	16,959.53	28,406.44	39,601.30	40,605.34	40,723.17

Cash flows

Year	Time 0	2021	2022	2023	2024	2025
Income		436,760.05	855,229.80	1,234,705.26	1,282,401.75	1,331,940.74
Total Costs		267,935.32	519,847.85	749,101.01	777,512.92	806,097.38
Depreciations		157,954.40	60,065.77	107,336.22	153,657.24	193,472.74
EBIT		10,870.34	275,316.18	378,268.03	351,231.58	332,370.62
Tax		543.52	13,765.81	18,913.40	17,561.58	16,618.53
Net income		10,326.82	261,550.37	359,354.63	333,670.00	315,752.09

Year	Time 0	2021	2022	2023	2024	2025
EBIT	0.00	10,870.34	275,316.18	378,268.03	351,231.58	332,370.62
Depreciations	0.00	157,954.40	60,065.77	107,336.22	153,657.24	193,472.74
Tax	0.00	543.52	13,765.81	18,913.40	17,561.58	16,618.53
FEO	0.00	169,368.25	349,147.76	504,517.66	522,450.40	542,461.89

Year	Time **0**	2021	2022	2023	2024	2025
FEO	0.00	169,368.25	349,147.76	504,517.66	522,450.40	542,461.89
Investment	-126,515.89	-165,823.84	-232,807.37	-231,159.53	-198,614.71	179,729.55
Change in working capital	-250,975.79	-240,465.62	-218,058.30	-27,407.87	-28,466.63	765,374.21
Project Cash Flow	-377,491.68	-236,921.20	-101,717.92	245,950.26	295,369.06	1,487,565.64

Q3. Determine the cost of equity using the CAPM methodology. Q4. Calculate the cost of capital using the WACC methodology, based on the information provided by the case and Damodaran Online databases.

Column1	Column2
Guatemala	GT
Bond rate	BB-
Default Risk Premium	3.50%
Stock Volatility/Bond Volatility	1.5
Country risk	5.25

Key Financial Data	
Debt Ratio	0.6
Tax rate	5%
Levered Beta	1.596
Daily Treasury Yield Curve Rates	0.628
Inflarion USA (CPI) (Average last 10 years)	1.578
Real Yield Rate	2.207
Spread Conutry Risk	5.250
Defaul Risk Prime (Agriculture)	2
Cost of the Debt	7.707
Equity risk premiun minus- RF	5.500
Inflation adjusted by currency exchange	3.863
Cost of the Equity	19.365
WACC	12.139%

Q5. Determine the internal rate of return (IRR), and net present value (NPV) of the organic onion production project.

IRR	30%
NPV	L530,412.82

Q6. If you were in the position of Eng. Ordoñez woud you recommend to accept the implementation of the organic project. Moreover, what proportion of financial leverage would be the most recommended?

Students need to evaluate the financial feasibility of the production project, based on the NPV and IRR, comparing it against the discount rate calculated using the WACC methodology. The NPV of the organic vegetable production project of Graz Group's new BSU is positive, which means that under the assumptions on which the project was evaluated it generates added value at the end of the analysis period. The project's IRR is 30% and is above the discount rate (WACC) 12%. is therefore established that the investment project is economically feasible.

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