Determining the Feasibility of a Bee Honey Value Chain

WPI

Submitted by:
Natalie Green
Luke Lindholm
Daniel Pelaez
Rachel Quinlivan

Determining the Feasibility of a Bee Honey Value Chain in Monteverde, Costa Rica

An Interactive Qualifying Project

Submitted to the Faculty of

WORCESTER POLYTECHNIC INSTITUTE

completed at the San Jose, Costa Rica Project Center

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

Submitted On:

February 26, 2019

Submitted By: Natalie Green, Luke Lindholm, Daniel Pelaez and Rachel Quinlivan

Submitted To: Professor Alex Sphar & Professor James Chiarelli, Worcester Polytechnic Institute

Sponsoring Agency: Centro Científico Tropical, San José, Costa Rica

Abstract

Creating a locally sourced value chain allows for the overall growth and sustainability of a local and circular economy. Our project goal was to determine the feasibility of establishing a new value chain using locally produced honey products within the Bellbird Biological Corridor and provide a recommended action plan in order to achieve this. We conducted market research and interviewed various enterprises and local beekeepers in order to perform financial analysis and provide guidance for the local producers to form the new value chain.

Acknowledgements

Our team would like to express how thankful we are for all the people that constantly offered support to us throughout our seven weeks and assisting us in completing our project. Without their expert guidance throughout our project we would not have been able to complete it and we are extremely grateful for all their help.

We would like to acknowledge with great gratitude the pivotal role of our sponsors **Damaris Chavez, Alexander González** and **Verónica Vargas** for all of the necessary guidance, knowledge, advice, encouragement and support throughout every step of our project. They helped us with everything on our project from guidance regarding our research to scheduling our stay in Monteverde. Without them, we would not have been able to complete our project.

We would like to thank our advisors **James Chiarelli** and **Alex Sphar** for their guidance, insight and advice throughout the entire project.

We would also like to thank **Doña Marcela Music** and **Melissa Belz** for coordinating our project with our sponsors.

We would like to thank the **Centro Científico Tropical (CCT)** for allowing us to assist in their initiatives and providing us with guidance and the necessary resources to complete the project. We would like to thank the organization for hosting us in Monteverde while we were conducting interviews with local enterprises and local bee honey producers. Particularly, we would like to thank **Lodge Manager Carlos Hernández** for helping to coordinate our stay in the CCT

lodging. All members of the organization were extremely helpful throughout our time in Costa Rica and we want to express our sincerest gratitude for the constant support we received.

Next, we would like to all the members of the **Asociación de Apicultores de Guacimal (APIGUACIMAL)** for taking time to meet with us and giving us invaluable information regarding their association. More specifically, we would like to thank **Luis Angel Ramirez Mendez** for coordinating the various interviews with members of APIGUACIMAL. We would also like to thank **Luis Roberto Solis Cruz** for staying in constant communication with our team following our interviews to answer any questions we had.

Finally, we would like to thank **all enterprises** in Monteverde and in the Bellbird Biological Corridor area that agreed to interviews with our team and provide us information specific to their business.

Executive Summary

Introduction and Background

The country of Costa Rica is widely regarded as one of the most sustainability focused countries in the world (Kissinger, M. & Rees, W.E 2009). The Centro Cientifico Tropical (CCT), established in 1962, is a non-governmental organization that helps protect the environment while promoting local economies through sustainable and educational practices. Their recent efforts have focused on the local economy of Monteverde where they have worked to connect local producers with the enterprises of the region in order to create a circular economy that benefits all parties. By creating these close-knit connections between the producers and consumers, the local community and the country as a whole are able to benefit from these sustainable practices.

Monteverde is a town that is home to 71 different enterprises. Located in Puntarenas province, it is renowned for its commitment to sustainability and conservation of the environment. Currently, the CCT is focusing their efforts on both environmental education and localization of the economy. The CCT hopes to create a more self-sustainable economy for this area by connecting enterprises with local producers and consumers.

Bellbird Biological Corridor

The Bellbird Biological Corridor was created from a multi-institutional initiative which sought to connect the Pacific-slope habitat from the Monteverde Reserve to the coastal mangroves of the Gulf of Nicoya (Three-Wattled Bellbird, 2018). Over the years, Monteverde has grown in popularity as a tourist destination. As a result, the number of enterprises in the area have also grown. The CCT has been focusing their efforts on identifying sustainable producers in the corridor who can meet the demand of the growing number of enterprises in order to achieve their goal of creating a self-sustainable economy in Monteverde.

Beekeeping in Costa Rica

Beekeeping, or apiculture, is defined as the activity dedicated to the upbringing of bees and to lend them the necessary care with the objective of obtaining and consuming the products that the bees produce (Apicultura). Casual beekeeping used to be popular in Costa Rica until the Africanized Honey Bee (AHB) arrived in 1983 (Spivak, Batra, Segreda, Castro, Ramírez, 1989) and profoundly influenced the native populations. After the AHB arrived, Costa Rica went from being a honey exporting country to a honey importing country. One of the potential producers for the honey value chain the CCT identified was the Guacimal Association of Beekeepers (APIGUACIMAL). The CCT wanted our group to help the organization by analyzing the cost structure of APIGUACIMAL and create a software tool to help APIGUACIMAL calculate their profit margins and create plans for future growth.

Project Goals

The goal of our project was to assist the CCT in preparing the technical, financial, and administrative analysis to determine the feasibility of creating a new value chain with locally produced honey bee products. This will allow Monteverde, and the region surrounding it, to become more focused on sustainability, thus improving Costa Rica's overall effort to protect its environment. Our team designed and completed five objectives in order to accomplish this goal.

1. Market Research and Current State of the Market

To complete out first objective, our team conducted online research regarding the current production levels of honey in the country, as well as how much was being imported or exported, in order to determine the overall demand for such products. Additionally, we gathered pricing data on honey products throughout the country by visiting various supermarkets, being sure to note prices and the different brands that were currently on the market and available to consumers.

2. Interviewing Local Businesses in Monteverde

In order to complete our second objective, our team conducted interviews with 42 businesses of varying industries in the Monteverde area. This was done to gather data that would be used to determine the current demand for honey products in the local region. The information we collected pertained to the purchasing habits of honey products specific to each business's needs as well as their opinion on sustainably and locally produced products.

3. Interviewing Beekeepers

For our third objective, we visited and interviewed nine different beekeepers who are part of the Association of Beekeepers of Guacimal located in the Monteverde region. From these interviews, we gathered quantitative and qualitative information that was used to create the final recommendations and suggested plan of action for the CCT and beekeepers. We collected information pertaining to the honey production process, finances, their current challenges, and their desired outcomes.

4. Identifying Common Themes and Performing Financial Analysis

To complete our fourth objective, our team gathered all of the data that we had collected in the field and analyzed it to identify common trends and develop final recommendations based on our findings. Additionally, we created various documents to present to our sponsor that displayed our findings in an organized and easy to understand format so that they can pick up where we left off and further develop the future value chain.

5. Create a Final Proposal to Give to the CCT

Finally, for our fifth objective, our team created an official proposal for government investment. This document that was presented to our sponsor contained all of our findings and

recommendations as well as financial projections that proved that investing in this honey value chain will be profitable over time. The CCT will continue to add information to this proposal and then formally present it to the Costa Rican government in May.

Results

Market Analysis of Honey in Costa Rica

Data was collected from the Food and Agriculture Organization (FAO) of the United Nations Statistics Database. We compared the changes of honey production in metric tonnes from the years of 1986 to 2016. We found that there was a downward trend in production from 2012 to 2014. During this time, the production fell to almost 750 metric tonnes from 1,300 due to severe drought within the country which lead to reduced pollen levels and hence reduced honey production (Rico, 2015). After 2014, production steadily increased to 1,100 metric tonnes in 2016 (Food and Agriculture Organization, 2019)

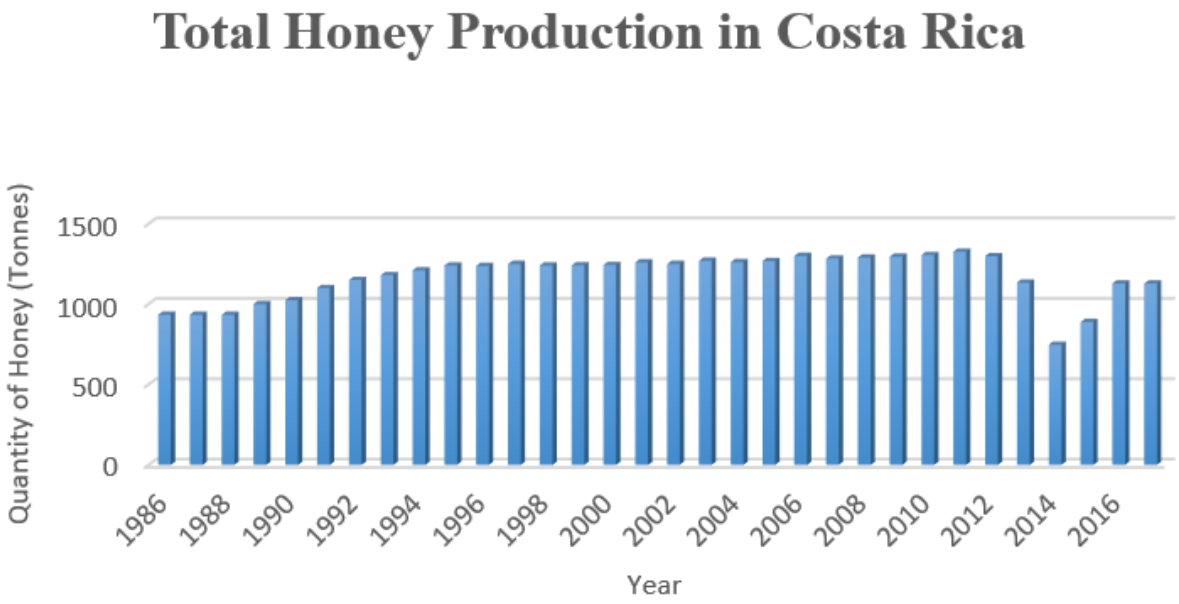


Figure ES1: Honey Production in Costa Rica, Food and Agriculture Organization (2016)

To analyze the competitors in the honey market in Costa Rica, we collected data of 10 brands of honey from six supermarkets. We found the average price per gram in colones for each brand, allowing us to compare prices across brands. We found that the honey produced and sold by the APIGUACIMAL has the lowest price per gram of all brands at 4 colones per gram. Below is a graph showing the price per gram of honey brands in Costa Rica.

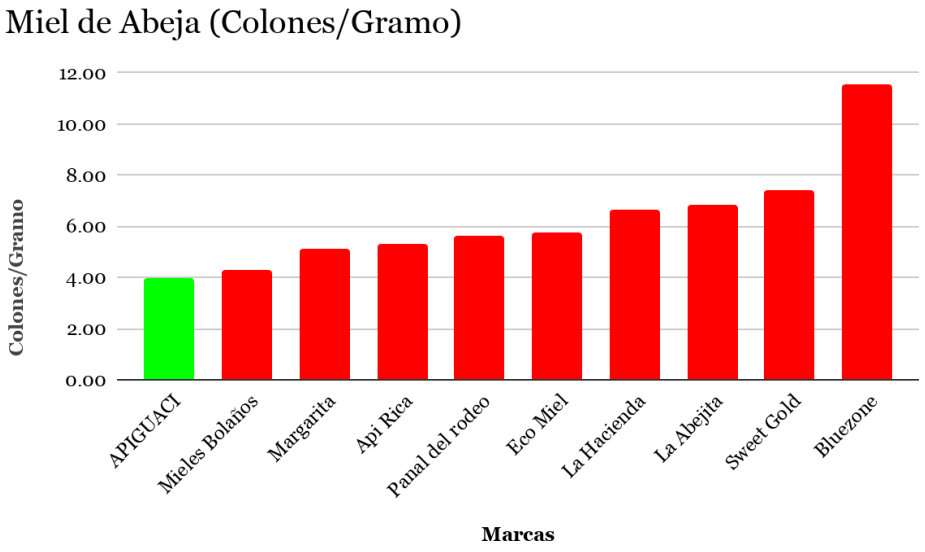


Figure ES2: Honey Brands' Prices per Gram

Interviews with Businesses in Monteverde

We found that cafes and hotels are the most likely to purchase honey out of all enterprises. The quantity in which businesses purchase honey varies greatly, from four 1,000 gram bottles a year to eight bottles a month. The overall demand in the region for the local businesses is about 334 bottles per year, or 334 kilograms while the total production of APIGUACIMAL is about 20,000 kilograms per year. The standard price that APIGUACIMAL sells a bottle for is 4,000 colones, making total revenue from selling to local business 1,336,000 colones or $2,225. These numbers do not include sales from grocery stores, which we assume to be higher. Based on this information, we concluded that selling solely to local businesses in Monteverde would not be feasible for the value chain due to the severe supply vs demand imbalance and the limited profit that can be made in the region compared to the beekeepers' potential.

Interviews with Beekeepers in the Bellbird Biological Corridor

The main honey production and harvest season begins in January and ends in March or April. To harvest honey, the beekeepers wear protective gear and extract frame inserts from the beehives. The frames are taken to another location to remove the honeycombs from the frame. The honeycombs are collected in a large container and centrifuged to remove the honey and put into 300 kg barrels. Barrels are bought by large companies for 725,000 colones each, or $1,150.

The amount of hives that each beekeeper owns, and as a result the amount of honey that is produced, varies widely between beekeepers. The total amount of honey produced and sold by the APIGUACIMAL is about 69 barrels or 20,700 kilograms. The honey is sold in 1 kilogram

bottles, 5 kilograms gallons, or 300 kilogram barrels. The percentage of honey sold in bottles vs barrels varies widely between beekeepers.

The major problems that the association currently face are: lack of communication, lack of information, financial pressures, lack of resources, and disorganization. Meetings are held once a month to discuss problems that the members are facing and potential solutions, but many members feel that attendance is low. For many members, these meetings are their only form of communication. The local beekeepers also lack specific information regarding the current honey market in the country and about the entire commercialized honey production process in general. They do not understand in detail the steps needed to take in order to sell their product commercially which will bring them a greater profit than their current selling scenario. The beekeepers rely on selling their honey to support their families and are forced to sell their product at any time they can, which results in them selling it to large companies who purchase the honey at a fraction of the price compared to the profit the beekeepers would be able to make if they were able to sell all of their honey in bottles under their own brand. Many beekeepers do not have the proper equipment to clean and bottle the honey in a sanitary way. There is no central location to harvest and bottle honey which limits their ability to receive a permit to sell their honey in grocery stores. This causes the beekeepers to sell their honey to larger companies at a low price. The final problem facing the association is disorganization. Only two of the members kept record of their finances, making it hard to monitor their business costs and profit.

Solutions that the beekeepers believe will be useful are: raising commitment to the association, a loan from the government, technical support, and improved financial skills and tracking. A loan from the government will allow the association to build a central harvesting location that is sanitary. This will then help the association receive permits to sell their honey to grocery stores. Improving the beekeepers' financial knowledge and tracking of finances will help the association monitor their profit and identify areas that can be improved. While the association may not be able to generate a profit within the first year or two of the new value chain's life cycle, if they receive an appropriately sized loan and remain consistent with recording their finances, they will have a high chance of creating a business that will remain successful for the years to come.

Deliverables and Recommendations

After analyzing our findings from each objective, we created a cost analysis Excel spreadsheet for APIGUACIMAL and completed a proposal that will be given to the Costa Rican government regarding our market and financial research. The deliverables created can be used by the CCT and APIGUACIMAL to portray the viability of the new value chain for local producers of bee honey products in the Corridor. The recommendations we formulated are for the CCT to conduct further research regarding the association.

Recommendations for APIGUACIMAL

In order to achieve their goal of commercializing, APIGUACIMAL must complete a few tasks. First, the organization must become more organized as a whole. The lack of communication and financial information is holding the organization back from maximizing their profits. In order to commercialize, the association must buy a plot of land, construct a building where they can bottle their honey in a sanitized way, obtain sanitation permits from the Ministry of Agriculture and Livestock (MAG) and create a brand. These steps will allow the association to commercialize and create a profitable business.

Developing a Local and Sustainable Market

We recommend that the CCT organize meetings between the local beekeepers of the association and the businesses in Monteverde who we have identified that purchase honey regularly or would be interested in purchasing sustainably and locally produced products. This will allow for future businesses agreements to be established that will help the beekeepers and enterprises engage in a constant demand and supply for honey within the local region.

However, as stated earlier, the association's annual production levels exceed the local demand by over 6000%. Due to this severe over-supply the association must seek to sell their honey elsewhere within the country of Costa Rica.

Local Sustainability

Due to the fact that the association will be a new brand, they will need some governmental assistance in order to commercialize. Through our interviews with the various members of APIGUACIMAL, the beekeepers said the following would be most useful for the government to understand acknowledge the importance of local producers to the economy, understand the importance of bees to the environment, and understand how giving support to a local brand would benefit the local community. The government can show that they are acknowledging the importance of both local producers and bees by showing interest in helping beekeepers.

Future Work

In order to aid the association in their effort to commercialize, more research will need to be conducted. Due to a lack of time our group was not able to interview all members of APIGUACIMAL or all of the enterprises in Monteverde. We recommend that the CCT conduct more interviews with the remaining members and to communicate more with local enterprises in Monteverde to see if a written contract or agreement can be made between the association and enterprise that would guarantee their intent to buy APIGUACIMAL's product. The CCT must continue to work with the association in their efforts to become more organized in order to ensure that the association can efficiently create a new business. Finally, further investigation must be conducted regarding the cost structure of the association so that a more accurate estimate can be made for the association's investment into new infrastructure and other future investment.

Authorship:

Chapter and Section #	**Primary Author(s)**	**Primary Editor(s)**
Abstract	All	All
Executive Summary	All	All
1.0 Introduction	All	All
2.0 Background	Luke Lindholm	Natalie Green
2.1 Sustainability in Costa Rica	Luke Lindholm and Natalie Green	Rachel Quinlivan
2.2 The Bellbird Biological Corridor	Luke Lindholm	Rachel Quinlivan
2.3 Centro Cientifico Tropical	Luke Lindholm	Rachel Quinlivan
2.4 Beekeeping in Costa Rica	Natalie Green	Luke Lindholm
2.5 Current Market State	Daniel Pelaez	Luke Lindholm
3.0 Methodology	Natalie Green	All
3.1 Market Research and Current State of the Market	Natalie Green	Daniel Pelaez
3.2 Interviewing Local Businesses in Monteverde	Daniel Pelaez	Natalie Green
3.3 Interviewing Local Beekeepers	Luke Lindholm, Rachel Quinlivan	Natalie Green
3.4 Identify Common Themes and Performing Financial Analysis	Rachel Quinlivan	Natalie Green
3.5 Creating a Final Proposal	Luke Lindholm	Rachel Quinlivan, Natalie Green
4.0 Results	Luke Lindholm	All
4.1 Market Analysis of Honey in Costa Rica	Natalie Green	Rachel Quinlivan
4.2 Interviews with Businesses in Monteverde	Daniel Pelaez	Rachel Quinlivan

4.3 Interviews with Beekeepers in the Bellbird Biological Corridor	Luke Lindholm and Rachel Quinlivan	Natalie Green, Rachel Quinlivan
5.0 Deliverables	Daniel Pelaez	Luke Lindholm
5.1 Cost Analysis	Rachel Quinlivan and Natalie Green	Luke Lindholm and Daniel Pelaez
5.2 Proposal for Government	Rachel Quinlivan	Daniel Pelaez
6.0 Recommendations	Luke Lindholm	Daniel Pelaez
6.1 Recommendations for APIGUACIMAL	Luke Lindholm	Natalie Green and Daniel Pelaez
6.2 Recommendations for Government Involvement	Luke Lindholm and Daniel Pelaez	Natalie Green and Daniel Pelaez
6.3 Recommendations for the CCT and Future Work	Luke Lindholm	Daniel Pelaez
7.0 Conclusions	Rachel Quinlivan	Daniel Pelaez

Table of Contents

List of Figures

1.0 Introduction

From the 1990s, Costa Rica has been widely considered a conservation and sustainability success story (Kissinger & Rees, 2009). The Centro Científico Tropical (CCT) was the first environment-focused non-governmental organization in Costa Rica and is currently one of the leading non-governmental organizations responsible for protecting the environment and for encouraging and promoting the economy through projects that enact sustainable practices (CCT Costa Rica, 2018). The CCT is dedicated to the acquisition and application of knowledge related to the lasting relationships of human beings with the physical and biological resources of the tropics (CCT Costa Rica, 2018). Over the years, the CCT has protected and preserved many biodiverse regions within Costa Rica by developing and employing management plans for their protected wildlife areas. With these plans the organization proves that conservation of tropical forests is not only the responsibility of the state, but that it can be carried out successfully with the assistance of the private sector as well.

The Bellbird Biological Corridor (BBCP) initiative began in 1992 as an effort to protect the endangered species, the three-wattled bellbird (Three-Wattled Bellbird Biological Corridor Council, 2018). Today, one of the most important aspects of BBCP initiative is the emphasis of the community on environmental conservation and a localized economy. The localized economy can only be self-sufficient and sustainable if there are a sufficient number of producers in the Bellbird Biological Corridor to meet the demands of the businesses in Monteverde. One of the factors that has allowed for the localization of product supply in the region is the relationship between the CCT and local distributors and businesses. We worked with the CCT to help

determine the feasibility of expanding to a market that has not yet been explored and to help cultivate more connections that would further the goal of increasing self-sufficiency.

The BBCP initiative is one example that demonstrated Costa Rica's commitment to become a nation that is self-sustainable. One sector of the economy that has helped fund Costa Rica's sustainable practices is eco-tourism. According to The International Ecotourism Society, eco-tourism is defined as responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education ("What is Ecotourism?", 2018). In 2016, the Costa Rican Tourism Board estimated that tourists visiting the country spent an average of $1,369.00 (USD) which totaled to over 2.6 million dollars, accounting for 5.8% of the country's GDP (Instituto Costarricense de Turismo, 2017). In 2009 nearly 46% of international tourists entering the country engaged in eco-tourism activities (Instituto Costarricense de Turismo, 2017). Susan Menkhaus and Douglas J. Lober researched into international eco-tourism and created a report to identify the valuation of tropical rainforests in Costa Rica and the study concluded that the value placed by U.S. eco-tourists on visiting Costa Rican rainforests was $1,150 per visit (Menkhaus & Lober, 1995). Costa Rica has truly adopted and expanded the eco-tourism sector of their economy and they are a leader of ecotourism throughout the world.

The goal of our project was to help the CCT determine if a new value chain for locally produced bee honey products could be created in the Bellbird Biological Corridor, as well as nationwide. We used the project outcomes to prepare a proposal to be submitted to the government to prove that investing in local beekeepers is a justifiable investment and will positively impact both the beekeepers and the local economy. In order to achieve this goal, our group conducted market research to determine the supply and demand for bee honey products in

order to prepare a financial analysis of the current market. This allowed our group and the CCT to determine if the value chain is feasible. Our team identified who will benefit from the value chain in the future and what markets can be improved by the use of the new value chain for bee honey products. In order to create an effective economic analysis, our team collected financial data from the Guacimal Beekeeper Association and from various businesses in the area.

2.0 Background

The ethical and responsible use of the environment are major topics of discussion by various organizations in Costa Rica. Pollinators such as the honey bee play a pivotal role in the environment. In this section, we discuss our sponsor, the CCT, and their role in Costa Rica as well as the location where we will be completing our project and the current state of the market there.

2.1 Sustainability in Costa Rica

Sustainability is defined as the study of how natural systems function, remain diverse and produce everything it needs for the ecology to remain in balance (Mason, 2018). There are three main pillars or key areas that contribute to sustainable development: economic development, social development, and environmental protection ("The Three Pillars of Sustainability", 2014). All of these pillars must be fulfilled in order to achieve sustainability. Costa Rica is one of the first countries to adopt sustainability and it serves as an excellent model for other nations looking to adopt sustainable practices.

Currently, Costa Rica makes up only 0.03% of Earth's surface, but it contains 5% of Earth's biodiversity ("Instituto Costarricense de Turismo," 2017). Also, the country produced

nearly 93% of its electricity from renewable resources and 30% of its territory is protected natural land ("PAX NATURA – Peace with Nature," 2018). Costa Rica developed many sustainable practices and their overall goal is to be the first carbon neutral country in the world by 2021. The nation's success in sustainable development can be explained mainly because of the country's attitude towards the environment and the important role that it plays in supporting the economy. This attitude towards environmental protection was first seen in 1994 when Costa Rica amended its constitution to include the right of "every person [..] to a healthy and ecologically balanced environment" ("UN University," 2011). This amendment, along with a variety of political changes such as the creation of Costa Rica's Forestry Department, the National Forestry Fund, and of the Pax Natura ("PAXTURA - Peace with Nature," 2018) movement are examples of Costa Rica's unbreakable relationship with nature.

Sustainability is a complex topic that requires commitment throughout an entire nation in order for it to be practiced effectively. Costa Rica is a prime example of a nation that is trying to become self-sustainable. The country has taken many steps towards this goal, and the creation of the Bellbird Biological Corridor is an essential step towards self-sustainability.

2.2 The Bellbird Biological Corridor

Since the initiative began in 1992, the BBCP has continued to serve as an area of protection for the three-wattled bellbird as well as a variety of other organisms. The BBCP is a multi-institutional initiative which seeks to connect critical Pacific-slope habitat between the Monteverde Reserve Complex along the continental divide and coastal mangroves of the Gulf of Nicoya ("Three-Wattled Bellbird Biological Corridor Council," 2018). In Figure 1 below, a map

of the BBCP shows the size and geography of the corridor ("El Corredor Biológico Pájaro Campana," 2018).

Figure 1. Map of the Bellbird Biological Corridor, CCT (2017)

The BBCP covers an area of approximately 165,000 acres and includes the watersheds of three different rivers (Penner, Gess & Beckman, 2017).

Currently, it is under the supervision of seven different organizations that have a variety of backgrounds in the academic, nonprofit, and international sectors of the economy ("Three-Wattled Bellbird Biological Corridor Council," 2018). The names of the original organizations in charge of the BBCP are the Arenal-Tempisque Conservation Area, the Costa Rican Conservationist Foundation, the Monteverde Conservation League, the Monteverde Institute, the Monteverde Reserve-Tropical Scientific Center, the Santa Elena Reserve and the University of Georgia-Costa Rica. All of these organizations share a common goal of being committed to conservation and environmental efforts.

2.21 The Monteverde Cloud Forest

Monteverde is a small yet popular tourist town located within the Bellbird Biological Corridor. The Monteverde Cloud Forest Reserve was established in 1972 by the CCT and initially covered about 810 acres of forest lands; today it protects over 35,000 acres and encompasses 8 different life zones atop the Continental divide Containing over 100 species of mammals, 400 bird species, 2500 plant species, and 1200 species of amphibians, Monteverde has an extremely high amount of biodiversity. Due to its extreme biodiversity and the increase of the popularity of ecotourism, Monteverde has grown to become a popular tourist destination within Costa Rica ("Monteverde Costa Rica," 2018).

There are both positive and negative effects that come as a result of this increased attraction to visit Monteverde. The economy has benefited greatly from ecotourism in Costa Rica. Preserving the rainforests and providing education on sustainability to tourists are two major initiatives that arose from an increase in ecotourism in the region. However, the increase number of tourists visiting has caused an increase of infrastructure, accommodations, and facilities, which has resulted in vegetation damage, disturbance of wildlife, and an increased possibility of erosion. There is an expectation of biodiversity losses in the Monteverde region in the near future (Koens, Dieperink, & Miranda, 2009). The growing popularity of the region has increased pressure on many local businesses in Monteverde to meet higher demands for goods and services. Due to this pressure, companies in the area are less inclined to consider social and environmental responsibility when it comes to decisions regarding their business.

Nevertheless, tourism policy is primarily the responsibility of the central government despite efforts in the mid-1990s to decentralize public administration and actions have been taken by the Costa Rican government to develop a more sustainable form of tourism. Yet, due to the fact that Monteverde is located far away from the municipal centers, it is very hard to plan, control, and implement such policies. To counteract this problem, the local population started their own initiative to overcome these problems. There is a history of community planning in Monteverde, which is a form of co-operative planning, in which problems are solved by forming a democratic committee that engages itself in the issues at stake (Koens, Dieperink, & Miranda, 2009). Along with community planning, there are a few prominent non-governmental protection agencies, such as the CCT, within this region that are committed to helping preserve, implement, and teach sustainable practices to the local towns and tourists who visit this region.

2.3 The Centro Científico Tropical

There are multiple organizations throughout Costa Rica that strive to utilize the environment in a non-wasteful manner. The Centro Científico Tropical (CCT) is one organization that is committed to finding ways to use the environment, both in everyday life and ecotourism, in a responsible way. Founded in 1962, the CCT was created to be a non-governmental association that could share knowledge about the rational and ecological use of the tropics. The CCT has participated in research for climate change, created Environmental Impact Studies, participated in debt-for-nature swap transactions, donated various levels of financial support for the Payments for Environmental Services, and has held various educational programs that are combating the negative impact industries can have on the environment. The CCT has

four protected wildlife areas in Costa Rica that aim to conserve the biodiversity and serve as a sanctuary for wildlife in any area where the forest cover has been dismantled ("CCT Costa Rica," 2018). There are many other roles of these protected areas, they also promote the relationship between humans and the environment through conservation activities and they are a good location to promote other conservation projects and any other efforts aimed towards conservation and sustainability in the region. The four protected wildlife areas of the CCT include The Monteverde Cloud Forest Biological Preserve, Los Cusingos Bird Sanctuary, San Luis Biological Reserve, and the Kelady Forest Reserve. Each of these areas actively participates in the CCT's mission and the creation and development of these protected wildlife areas has been a key step in the overall goal of achieving local sustainability.

One of the CCT's Protected Wild Areas in Costa Rica, and where their efforts of promoting sustainability are especially noticeable, happens to be the Monteverde Cloud Forest Biological Preserve. Within Monteverde, such projects of sustainable agriculture and environmental education are being implemented with a goal of broadening the number of relationships local businesses have with product and food suppliers based in the Bellbird Biological Corridor.

2.31 Previous Work by the CCT

The CCT's past and current efforts have all focused on preserving the environment and educating others to do the same through collaborative projects with various organizations.

In 2017, an IQP group from WPI worked with the CCT on a research project that analyzed Corporate Social Responsibility (CSR) practices within the Bellbird Biological Corridor and worked on improving the application of the CSR model for businesses local to that area (Carnein, Emrick, Nemes, & Venter, 2017). CSR is a self-regulating business model that

helps a company be socially accountable to itself, its stakeholders, and the public. By following such a business model, companies can be more aware of what kind of impact they are having on their surroundings on several levels, which include economic, social, and environmental aspects (Thompson, 2005). The goal of the CCT and the group from WPI at the time was to create and refine a CSR program for businesses in the country that combined economic decision making practices with a reinforced focus on social accountability and sustainability of the local communities.

The following year, in 2018, another IQP team continued with the previous work that had been done to enact specific projects that would improve businesses' use of the CSR program (Cardona, Ciliberto, Gray, & Peura 2018). While the project from 2017 concluded that very few businesses in the country followed a CSR model, the group from 2018 create a five phase program to implement and improve CSR practices within the Costa Rican community. This in turn helped provide businesses with a clear framework to follow, aiding them on their road to success while remaining socially responsible. It is from this point where our project picked up where the other two left off and investigate the finer details in order to determine the feasibility of creating a self-sustainable business model using locally sourced honey bee products. With the past research and planning that was done, we had a better understanding of how to create a new value chain in a location where CSR practices are becoming more popular and of interest to businesses, both new and those that are already established.

2.4 Beekeeping in Costa Rica

Due to the fact that the value chain that we researched focused on bee honey products, it was important to understand the beekeeping process in Costa Rica. Honey bees are an important

part of the environment due to the fact that they perform approximately 80% of all pollination worldwide ("Save the Bees," 2018). In fact, 77% of the world food supply depends on pollinators ("The World Bee Project," 2018). Beekeeping, or apiculture, is defined as the activity dedicated to the upbringing of bees and to lend them the necessary care with the objective of obtaining and consuming the products that the bees produce. Approximately 40 years ago, backyard beekeeping was common in Costa Rica and the less aggressive manner of the main species used, *Apis mellifera* (European Honey Bee), meant the use of specialized and protective gear was not common ("Dorada de la Bajura," 2017). However, the arrival of the African Honey Bee (AHB) 35 years ago changed the beekeeping process in Costa Rica.

The AHB is a hybrid of the European Honey Bee and an African subspecies, *Apis mellifera scutellata*. The stronger genetics of the AHB allowed it to quickly dominate and profoundly influence the local bee population in Costa Rica (Gabrich, 2017). The aggressive and protective manner of the African Honey Bee deterred many casual beekeepers from continuing the practice. This caused Costa Rica, a country that used to export honey to other countries, to become a nation that needed to import honey from outside countries (Stark, 2018). However, some beekeepers continued with the practice and adapted, using more protective gear and smoke to help manage the bees. The beekeepers that continued found that though lacking in a good temperament, the African Honey bees were excellent honey producers.

2.41 The Guacimal Association of Beekeepers

Guacimal is a small rural town approximately 45 minutes away from the Monteverde Cloud Reserve and the nearby town of Santa Elena. It serves as the central location for the Guacimal Association of Beekeepers, also known as APIGUACIMAL which comes from the Spanish name for the group, *Los Apicultores de Guacimal*. APIGUACIMAL was founded in

2013 because the local beekeepers in the area saw an opportunity to create an organization that could more easily get help from the government, help their community, and help each other. However, this organization has not been without its problems. Around 2 years ago the original APIGUACIMAL dissolved due a lack of organization and infrastructure issues, but after becoming more exclusive and organized APIGUACIMAL was reestablished. With the new selectivity and organization, the beekeepers are now able to benefit from increased support, easier access to markets and contacts, and better selling prices. While the new APIGUACIMAL is an improvement to the old organization, many of the challenges encountered by the first organization still exist. Many of the beekeepers feel that the infrastructure of the organization is still unorganized, there is a lack of communication and differing ideas about the direction the organization should head in, but overall all of the beekeepers feel that the biggest obstacles are not having a brand to sell their honey under and not being able to obtain a sanitation permit for the group as a whole. Having a registered brand with the ministry of health and a sanitation permit would allow the members to sell their honey to a wider variety of markets and would enable the beekeepers to sell their honey at a higher price.

In the current state, the association supplies their honey to two major companies in Costa Rica. The first is called Manza Té. Manza Té is a large Costa Rican company that offers a wide variety of food and beverage products. It has been in the market for 45 years. Their brand of honey, La Abejita, is one of the largest honey brands in Costa Rica ("Manza Té," n.d.). The second company is called Rosaval. Rosaval is, "a commercial group dedicated to the import, packaging, elaboration and distribution of food products in the national market." The company was started in 2004 and is a smaller corporation than Manza Té with only 20 workers ("Empresa

de Inversiones Rosaval," n.d.). The degree of competition among these two companies does not seem to be very strong, as they both are buying honey from the association at four thousand colones per bottle of honey.

2.5 Current Market State

Compared to neighboring countries in the Central American region, the economy of Costa Rica depends largely on eco-tourism as the nation is one of the most popular tourist destinations in Central America and it contains a great amount of biodiversity within its tropical regions. The people of Costa Rica have recognized this and have continued to push for CSR practices to be implemented within local businesses that take advantage of the popular tourist destinations while protecting the environment that many of the businesses depend on for their goods and services.

The businesses in the Monteverde region in particular rely on the positive benefits of ecotourism to support the local economy there. Monteverde is located in one of the most bio-diverse areas of Costa Rica and is within the top five most frequently visited tourist destinations in the country (Chaves, 2018). There have already been successful attempts of creating a local value chain within the economy of Monteverde which have reaped the aforementioned benefits of the area. The CCT would like to determine if a new localized value chain can be created using the honey bee products of local farmers in a circular economy where these products will be sold directly to the consumers in the region, including: hotels, restaurants, and cafes that cater towards tourists (Chaves, 2018).

In the current state, natural honey can be hard to come by in Costa Rica. Many honey brands are not native to Costa Rica and as stated before, honey is often imported from other nations in Central America due to the large demand for honey in the country (Stark, 2018). Because of this, many of the local beekeepers in the Bellbird Biological Corridor have no problem with competitors in the honey market and are able to sell their honey quite easily. However, the beekeepers of Guacimal struggle with selling their honey at a price that is reasonable for both the consumer and producer. This is due to the fact that they lack a brand for the entire association and they currently do not have a sanitation permit from the Ministry of Agriculture and Livestock (Chaves, 2018). Without these two important requirements, the local beekeepers in Guacimal struggle to receive a price that adequately reflects the quality of their product. Although demand for honey is quite high in Costa Rica, local beekeepers often struggle with the ability to sell and market their products for a fair price.

As stated in the *Beekeeping in Costa Rica* section above, the African Honey Bee dramatically affected the beekeeping industry. According to the Food and Agriculture Organization of the United Nations, bee honey production in Costa Rica has varied throughout the recent years. In 2010, Costa Rica produced 1305 metric tonnes of honey, in 2015 the country's production decreased to 889 metric tonnes of honey and the most recent data from 2017 shows that the country produced 1128 metric tonnes of honey (Food and Agriculture Organization of the United Nations, 2018). The figure below shows how honey production in Costa Rica has varied within the last 7 years dating back to 2010.

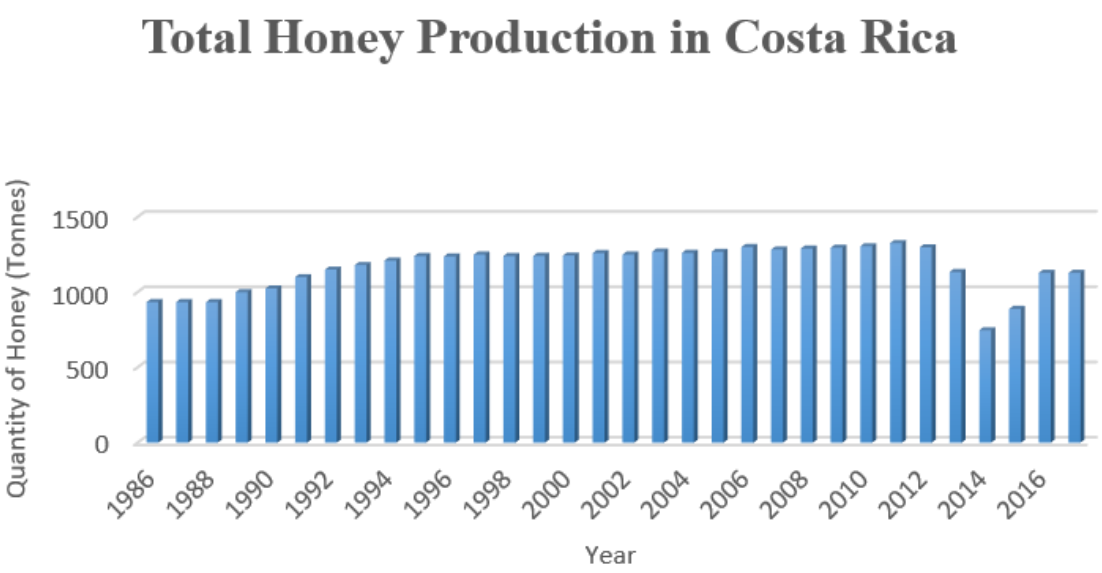


Figure 2. Graph of Honey Production in Costa Rica, Food and Agriculture Organization of the UN (2016)

2.51 Determining Market Feasibility

It is important to determine the feasibility of bee honey products in the Bellbird Biological Corridor to ensure that a value chain of such products would be feasible. The steps that are necessary to determining market feasibility are: identify stakeholders, identify competitors, identify target market(s) and conduct in-depth market research, and determine costs and make a projected income statement ("Conducting a Feasibility Study," 2018). These steps helped us meet our project goals by determining the viability of this value chain.

Identifying stakeholders is important to analyzing how the honey bee products will have an effect on the surrounding area, the people in it, and those directly involved in the supply chain process. CCT puts an emphasis on positive relationships between humans and nature, so it is important to determine if the products will negatively impact any person or other living

organism. Examples of stakeholders are: customers, beekeepers, those living in the Bellbird Biological Corridor, and investors of the value chain.

Identifying competitors is important to ensure that a new product will be competitive and stand out in any market. There are multiple ways to do this including having a lower price, better quality, or a positive impact that other companies do not have. This differentiates a product and ensures that multiple companies are not competing for the same customers. Identifying competitors can also determine if the market is oversaturated. This avoids targeting markets that are already being filled ("Conducting a Feasibility Study," 2018).

It is important to understand your customer so that you can appeal to them in the best way possible. Markets today are oversaturated and having too broad of a target market can be expensive and ineffective. Knowing information about a target market, such as age, gender, and socioeconomic status means that businesses can create marketing strategies that are far more effective (Davis, 1999). Businesses can also differentiate themselves from similar businesses by attempting to target different markets. Especially for small businesses, having a target market allows businesses to optimize their marketing dollars. Determining market feasibility is an important tool to any business as it gives insight into the customers and costs of running the business. This helped us determine if a value chain of bee honey products is feasible.

Determining costs, both fixed and variable, and creating a projected income statement provides valuable insight into how well a company will be able to handle costs. Fixed costs are costs that a business incurs regardless of how many products are made and sold. This includes costs such as salaries of employees, rent, and utilities. Variable costs are related to the number of products produced and sold. This includes materials, shipping, and labor directly involved with making the product. Lowering fixed and variable costs will allow a company to increase their

profit margin. Determining costs will help companies set realistic price points for products. In order to achieve this, we created both an estimated pricing strategy and distribution strategy, as well as the calculated costs associated with each. This was then be compared to the estimated revenue which was found by comparing the number of potential consumers and various price points that could be associated with the products. By creating a projected income statement, companies can get a detailed look at their finances and examine where costs may need to be cut.

Instructions for understanding an Income Statement:

1. Revenue is the total money made through sales. This is calculated by number of units sold multiplied by the cost of one unit
2. Cost of goods sold (COGS) is the total amount of money spent on costs directly related to creating the product.
3. Gross profit is calculated by subtracting the COGS from revenue.
4. Gross profit margin is the gross profit margin divided by revenue and multiplied by 100 to make it into a percentage.
5. The lines under "Operating Expenses" detail all of the costs associated with the business. Column B names the cost and Column D shows the total price of that cost.
6. "Total Operating Expenses" is the sum of all the costs.
7. "Net Profit" is the gross profit minus other expenses such as taxes on income, salaries, and debt. In the case of the beekeepers, these costs do not apply to them, so the gross profit and net profit are the same.
8. The "Net Profit Margin" is the net profit divided by the revenue and multiplied by 100 to make it into a percentage. (Reh, 2018)

3.0 Methodology

The goal of our project was to help the CCT establish if it is feasible to create a value chain with bee honey products between the enterprises in Monteverde and local producers in the Bellbird Biological Corridor. To achieve this, it was necessary to do market research in San José and travel to Guacimal, the area where the local producers are based out of, in order to gather information about the process of responsible beekeeping. We then interviewed the members of the Guacimal Association of Beekeepers and performed field research in Monteverde to collect data about the bee honey product buying habits of local enterprises. In order to ensure the feasibility and profitability of creating a bee honey product value chain within the corridor and strengthen the relationships between enterprises and local producers, we completed the following objectives:

1. Market research and current state of the market
2. Interview local businesses in Monteverde
3. Interview beekeepers
4. Identifying common themes and performing financial analysis
5. Create a final proposal to give to the CCT

3.1 Objective 1: Market Research & Current State of the Market

Our first objective was to analyze and gather data on the production of bee honey products and the current state of the market for these products in Costa Rica. This information was used to analyze how honey production in Costa Rica has changed throughout the years. To gather information for this objective, our group conducted research through an online database

created by the United Nations and also traveled to various supermarkets in the San José and Monteverde area.

To gather information on the overall bee honey production in Costa Rica we used the Food and Agriculture Organization (FAO) of the United Nations statistic database to compare the production quantity of bee honey by year starting from 2010 up until 2016. This data was used to compare the trends in production over a six-year period and help to give us a better picture as a whole as to the current state of the market. Additionally, we added questions focused on what the current market has been like in our interviews with the bee honey producers in Guacimal.

We gathered supermarket information from two different areas: San Jose and Monteverde. During our visits to the supermarkets we noted the prices, displays, and various brands of the bee honey products that were being sold. This information helped us determine the average cost of honey per gram from the differing companies at differing supermarkets. This in turn helped us to determine and recommend a fair price point for the local beekeepers of Guacimal to sell their products at to make the value chain both feasible and profitable.

3.2 Objective 2: Interviewing Local Businesses in Monteverde

Our second objective was to perform a market analysis of the businesses local to Monteverde in order to determine the current demand for honey and honey products. This was accomplished by conducting interviews with businesses of varying industries in the Monteverde region. Our group knew in advance that we would be staying in Monteverde for five days in order to conduct interviews with the local beekeepers of the province of Guacimal. Since interviewing the beekeepers was the most crucial part of our trip, we called and emailed many of

the businesses in the area in order to dedicate as much time as possible to visiting the beekeepers. As a result, we were able to obtain information from several hotels, restaurants, cafés, and other businesses in this way. We also set up in-person interviews with a few businesses that regularly purchased large quantities of honey as they knew more about the entire process than businesses that did not purchase honey. When our group arrived in Monteverde we spent three of the five days there visiting businesses with which we planned to follow up in person and also conducting many on-the-spot interviews with the businesses and shops that did not have a listed phone number or email address. In total our group was able to speak to 42 businesses in the Monteverde area and collect a vast amount of information on the demand for honey and its place in the local market.

Our group had prepared three similar, but slightly different, interview scripts for hotels, restaurants, and cafes/bakeries as they had a few specific questions tailored to the specific line of business. Each interview started off with an introduction of ourselves and asking politely if anyone would be willing to spare a few minutes to answer some questions for a research project that we were completing with WPI and the CCT. We then provided a brief background on our project and followed up asking whether or not their business used honey or honey products in any way. If they did not, we asked why the business does not buy honey and if the business would be interested in buying local products produced in a more sustainable way. If they did, we would then continue to ask questions such as where the honey was purchased, how much was purchased and how often; and for what price. All three interview scripts are presented in Appendix A.

3.3 Objective 3: Interviewing Local Beekeepers

To prove that a honey value chain is feasible, we needed to understand various aspects of the production process. To obtain this knowledge, we interviewed 16 beekeepers in the Bellbird Biological Corridor. The questions we asked helped understand their methods of production, who they sell to and why, and how they distribute their product. We wanted to understand exactly what the honey producers do and why. The questions were focused on determining the quantity that they produce, their current methods of selling and distributing their products, their ideal version of selling and distributing their products, and what challenges they face in achieving this goal. We then asked quantitative questions, such as how much it costs to produce one unit of honey, what is the selling price of one unit of honey, what is their profit margin, and the quantity of honey that they produce. These questions will ensure we understand the producers' perspectives and enable us to perform financial analysis. The script for our interviews with the Guacimal Association of beekeepers is presented in Appendix B.

3.4 Objective 4: Identifying Common Themes & Performing Financial Analysis

Once key issues and stakeholders were identified in the bee honey product market, we analyzed the information from the interviews that we completed to understand the process as a whole. To do this, we compiled and analyzed both our qualitative and quantitative data. This included: identifying overall sentiment about the process, analyzing any issues that are part of the process, and identifying what is being done to fix these issues.

In order to address the qualitative data that we collected, we found common themes and

issues that were identified in our interviews. This allowed us to understand the overall sentiment towards bee honey products and the process and what the key issues are that negatively affect local businesses from purchasing honey bee products locally.

To address the quantitative data, we compared costs across retailers and producers, determined supply from producers, and determined the amount of product desired from retailers.

When we collected all of our data, our team performed an in-depth financial analysis on the potential value-chain of local honey products. In order to determine that this new business will be profitable and have the ability to grow, we created a projected income statement and cash flow statement. Projected income statements are standard tools used when creating a new business plan as they serve as good estimations of how a company will fare over time and they measure the financial earnings performance over a specific period of time (Helstrom, n.d.). We estimated one year of revenue and the costs of one year of beekeeping based on the average number of hives owned by each beekeeper. From those numbers, we were able to complete the projected income statement and cash flow statement. Our financial analysis carefully compared the business-related expenses with the revenue to allow us to determine if the beekeepers will be profitable in selling their new line of honey bee products.

3.5 Objective 5: Creating a Final Proposal

The overall objective of our entire project is to create a final proposal that will be given to the Costa Rican government to show them whether or not a new value chain for bee honey products in the Bellbird Biological Corridor is feasible and worth their investment. In the final proposal, there are many questions answered as a result of our field work and the objectives stated above. The proposal has two main objectives that were completed:

1. To develop a market research plan determining the demand for the value chain products
2. To determine the demand for the value chain products

Topics identified through the market study include but are not limited to: the possible consumers; any linked markets; the potential customers; a target consumer population and any competition that is currently found within the market. The economic-financial study determined if the budget from the government is adequate for the proposed project, the current net present value of the project, the internal rate of return, the investment recovery period and any critical points that might not be materialized. These aspects are very important in the government's final decision on whether or not they should invest in the Asociación de Apicultores de Guacimal.

4.0 Results

In this section we outline our findings, results, and the qualitative and quantitative data that we have collected for each of our objectives. We will discuss our research regarding the current honey market in Costa Rica and all of our findings related to our interviews conducted with both the businesses of Monteverde and the local beekeepers in the Bellbird Biological Corridor.

4.1 Market Analysis of Honey in Costa Rica

In order to gain insight on the honey market in Costa Rica, we used a United Nations statistics database to gather information about the production quantity of honey from the years of 2010 through 2016. While more recent data beyond 2016 is not available, we were able to gain valuable information to help us better understand the current honey market of Costa Rica as a whole. To understand the local honey market of the regions where we were conducting our

project, we spent two weeks traveling to different supermarkets in the San José and Monteverde areas to survey the prices, displays, and various brands of honey products being sold. Although, our sample size of grocery stores was small, due to the limited number of brands of supermarkets, we were able to obtain enough variety and data to further our insight on the current local honey market. Through the research that we conducted, we were able to discern important trends in the overall honey market and find the average cost per gram of honey of all the brands. We then compared these average costs to the honey being sold by the local beekeepers in order to determine a feasible and competitive price range for their product.

4.1.1 Market Analysis of the Entire Country

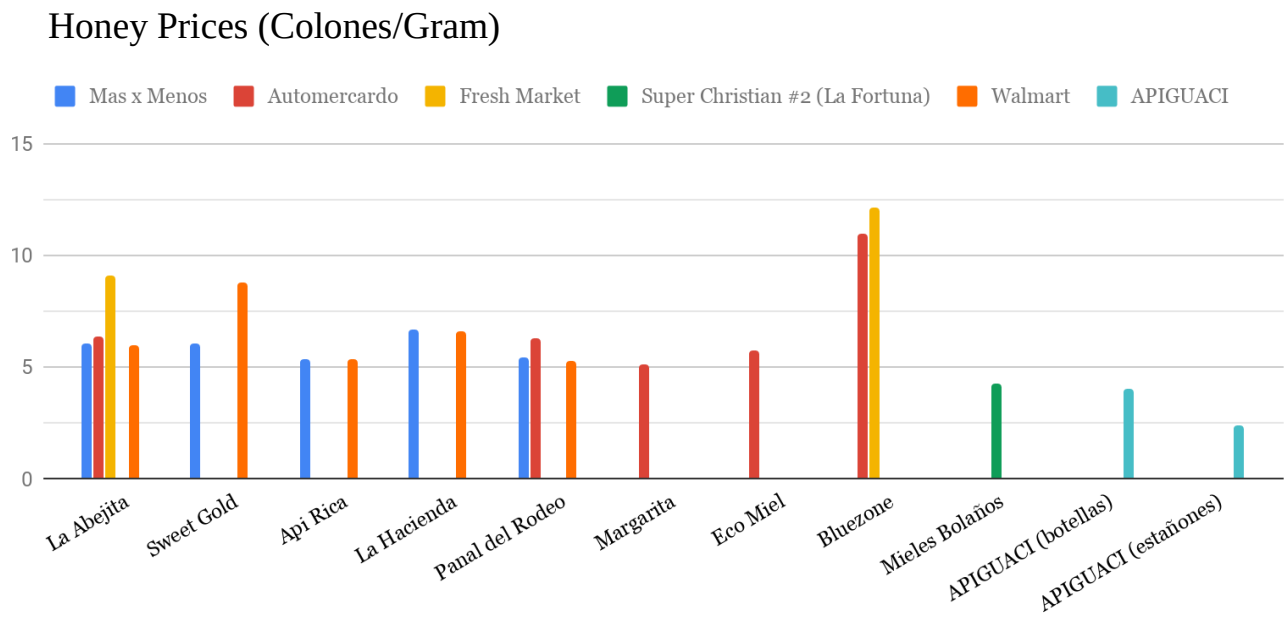
When conducting market research using the Food and Agriculture Organization (FAO) of the United Nations statistic database, we compared the changes of how much honey was produced in metric tonnes from the years 1986 to 2016. From the comparisons we found that starting with the year 2012, there began a downward trend in the amount of honey being produced in Costa Rica until the year 2014. During this time the amount being produced per year went from 1,300 metric tonnes to around 750 metric tonnes. But then, starting in 2014 the production began to steadily increase until 2016 when the production plateaued out at just above 1,100 metric tonnes per year. A chart of this data can be found above in section *2.5 Current Market State.*

4.1.2 Data from Supermarkets

Through our data collected from the six supermarkets that we visited, we were able to compare the prices of 12 different brands for bee honey products being sold. Our team found the average price in colones per gram for the 12 different brands of honey being sold at each

supermarket where the honey products were found. From this data we were able to see what brand was the most expensive per gram, the range of price per gram, and the consistency of prices across supermarkets. Below is a chart with our findings from the data we collected from the supermarkets we visited.

Figure 3: Prices of Honey Brands



This chart shows that the most expensive honey brand per gram was Bluezone found at Fresh Market and that the least expensive honey brand per gram was the honey sold by APIGUACIMAL. Additionally, this graph also shows that most honey prices per gram stay consistent across the brands and various supermarkets. With this information we averaged the price of one brand from the different markets to come up with an overall average in order to compare them to the selling price per gram of the APIGUACIMAL beekeepers. The chart below demonstrates our findings that the APIGUACIMAL beekeepers are the lowest selling price per gram at 4 colones per gram. We also observed that the brand La Abejita, whose parent company is Manza Té and who buys a large portion of APIGUACIMAL's honey and sells it at a 62% increase of the price of APIGUACIMAL's honey at 6.5 colones per gram. With this information

obtained about the current honey market, our team was able to make an informed decision and recommendation to APIGUACIMAL on how they can better their selling tactics and be more successful in the honey market.

4.2 Interviews with Businesses in Monteverde

Our team interviewed 42 businesses in Monteverde in order to obtain data and other information pertaining to their demand for honey and their purchasing habits. The types of businesses interviewed included hotels, cafes, restaurants, grocery stores, tourist shops, and specialty food stores. Our team chose to interview a wide range of businesses so that no information was left uncovered as we were not able to find out ahead of time which industries used more honey than others. Overall our team was able to collect valuable information about the local demand for honey in the region, details on the quantities that were purchased by individual businesses, the frequency at which they bought, and who/where they bought it from. With this newly obtained information, our team was able to make informed conclusions regarding the overall demand of honey and whether the beekeepers of Guacimal would be able to enter this local market successfully.

4.2.1 Trends Found within the Businesses

Our team found that overall there was a demand for honey within the region. However, this demand only was applicable to certain industries. The chart below indicates the number of businesses that purchase honey separated by industry.

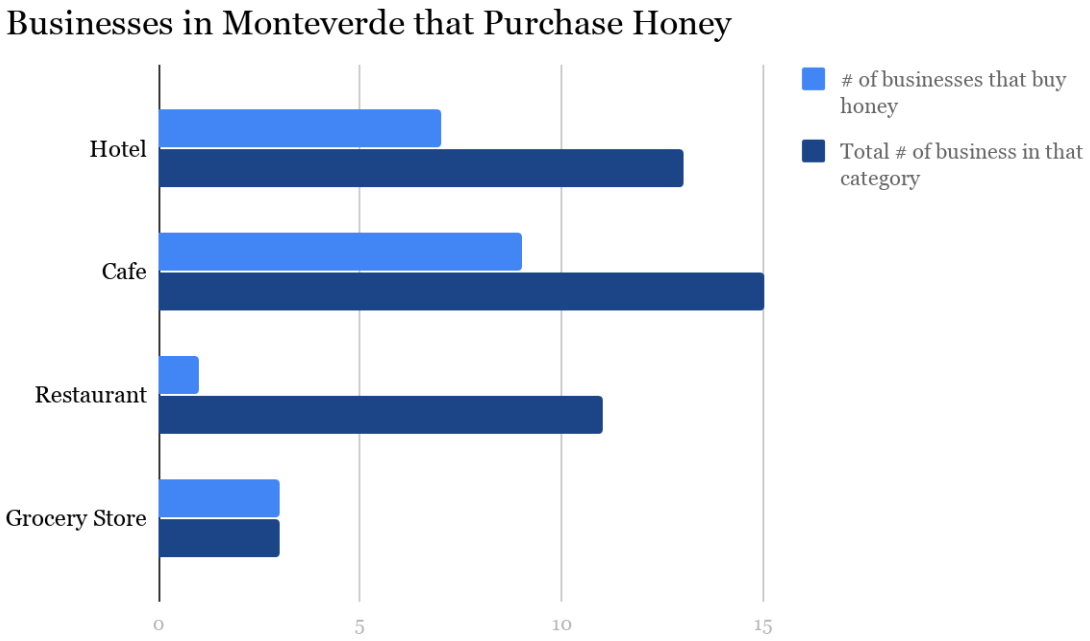


Figure 4. Monteverde Businesses that Purchase Honey

This chart shows the total number of businesses interviewed of each industry (in dark blue) and then displays the number of those that regularly purchase honey (in light blue). Of all the businesses that we spoke to, cafes and hotels were found to be more likely to purchase honey compared to restaurants. Additionally, all three grocery stores in Monteverde that we visited bought and sold honey. From this information we are able to conclude that there is a local demand for honey in the region, however it may not be a strong enough market for the new value chain to survive off of this demand exclusively.

Of the businesses that purchased honey, the quantities that they purchased in ranged from three or four 1000 gram bottles every year to eight bottles every month. The overall total demand in the region is about 334 bottles (1000g) per year. It was also found from our interviews that the standard price for a bottle of honey was 4,000 colones so the total sale of bottles per year is 1,336,000 colones or about $2,225 USD. See Appendix B for the responses of all businesses that

purchased honey regularly. It is worth noting that these numbers do not include the amount of honey that the grocery stores bought and sold every year as we were unable to speak to the employee in charge of ordering stock during our short visit.

While there is a demand for honey in Monteverde, our team has concluded that it is not large enough to make the new honey value chain viable in just this one location. Instead the local beekeepers should seek to sell their products throughout the country in order to have a greater audience and ultimately generate greater revenue from their sales. We shall discuss this issue further in our 'Solutions for the Beekeepers' section below.

Additionally, all of the businesses that were interviewed, those that bought honey and those that did not, expressed interest in purchasing products that were locally produced by sustainable practices. This overall sentiment bodes well for the beekeepers who wish to sell their locally and sustainably produced honey. We recommend that they exploit this trait of their product through marketing and branding as such products have become popular throughout Costa Rica due to the overall eco-friendly and sustainable mindset of the people.

4.3 Interviews with Beekeepers in the Bellbird Biological Corridor

We conducted in person interviews with nine different beekeepers that are a part of the Association of Beekeepers in Guacimal, also known as APIGUACIMAL. Although we were not able to visit all members of the association, due to project time constraints, we were able to obtain valuable information relevant to the project goal. Through these interviews, we were able to discover many things about the association, including their current process of harvesting honey, the current condition of their production sites, the issues they face and some solutions that they feel would help improve or solve these issues.

4.3.1 The Current Process

Figure 5. Various Apiaries of APIGUACIMAL

When interviewing the beekeepers, we asked questions regarding their current situation and how they produce and sell their honey in the market. In their current state, the majority of the beekeepers produce their honey in various apiaries that they have. The number of apiaries that the beekeepers own ranged from one location to seven locations. First, the members must tend to their hives during the year and the main production season begins in January and ends in March or April. To harvest the honey, the beekeepers go to their hives, with protective gear and begin to extract the frames from the beehives. The frames are then taken to an external location so that all of the honey can be removed from inside the honeycombs in the frames. After the combs are collected in a large container, they are centrifuged and then put barrels that contain 300 kilograms of honey. The barrel is then bought by a large company called Manza Té or Rosaval at a price of 700,000 colones or approximately $1,150.

Figure 6. Current Member of APIGUACIMAL Extracting Honey

Due to financial pressure and the limited market APIGUACIMAL has access to, the members of APIGUACIMAL often sell their honey to Manza Té and Rosaval at much lower prices. This is because these companies have the power to set the prices at the rate, they want with the beekeepers having no opportunity of knowledge of how to negotiate for a better price.

4.3.2 Data Regarding Production

Through our interviews, we received data from the beekeepers regarding their production, including: number of hives, number of barrels produced, number of barrels they sell, number of bottles they sell, and prices of their product. There is a lot of variation in how much honey is produced by each beekeeper, how the beekeepers sell their honey, and who they sell to. Figure 7 below shows the data collected. Information is still being gathered.

Nombre	# Apiarios	# Colmenas	# Estns. Producen	# Estns. que vendan	# Estns. vendidos en bot.	# Bot. que vendan	% Que Vendan en Estan.
Leonel Solis Cruz	7	140	15	9	6	1800	60%
Eduardo Solis Cruz	5	90	12	12	0	0	100%
Marvin Villalobos Sibaja y Danilo Mendez Chavarria	3	70	8	2	6	1800	25%
Fabio Mendez Villalobos	3	50	5.5	1	4.5	1350	18%
Carlos Cruz	5	70	6	4	2	600	67%
Victor Fernandes Mora	1	13	1.25	0	1.25	380	0%
Roman Cruz Solis	2	22	3	3	0	0	100%
Luis Angel Ramirez Mendez	6	90	9	8	1	300	89%
Geraldo "Lalo" Cruz							
Victor Hugo, Luis Roberto, Leonel, Eduardo	1	25	3.3	3.3	0	0	100%
Ricardo Uribe							
Roberto y Moises Arguello	5	60	6	1	5	1500	17%
Lupe Cruz							
Freddy Cruz							
Promedio - Mean	3.80	63.00	6.91	4.33	2.58	773.00	57.54%
Intervalo - Range	1 - 7	13 - 160	3 - 17	1 - 12	0 - 6	0 - 2100	0 - 100%
Desviación Estándar - Std Dev	2.10	38.42	4.23	3.99	2.53	758.04	0.40
Total	38	630	69.05	43.3	25.75	7730	

Figure 7. Beekeeper Data

As shown in the table, the amount of hives that each beekeeper owns, and as a result the amount of honey produced, varies widely between beekeepers. The total amount of honey produced and sold is 69 barrels or 20,700 kg of honey. The beekeepers are able to sell all of the honey that they produce, but the methods of selling also vary widely between beekeepers. Some sell all of their honey in bottles, which leads to a higher price per kilogram for their honey. Others sell all of their honey in barrels, which yields a lower price per kilogram. The majority sell in both barrels and bottles, but there is variation in how much they sell of each. There is a

limit to the number of bottles that the beekeepers can sell based on demand in the local area. The beekeepers had, at one time, been selling bottles in a local grocery store, but the bottles were removed by the MAG because they did not have the necessary permits to sell in stores. As the association currently stands, they do not have the necessary resources to obtain the proper permits, which limits their ability to sell their honey in bottles.

4.3.3 Issues Faced by the Association

The association faces many problems that they are working to solve. These issues were identified by a majority of the beekeepers that we interviewed. The major problems that they face include: lack of communication, lack of information, financial pressures, lack of resources, and a lack of organization.

The organization currently meets approximately once a month to discuss problems they may have and to help any members that may need it. However, many members felt that these meetings are not taken seriously and attendance at the meetings is often quite low. A lack of communication between members is clearly evident due to the fact that they only meet once a month and for many members this is their only form of communication with the other members.

The local beekeepers also lack specific information regarding the current honey market in the country and about the entire commercialized honey production process in general. They do not understand in detail the steps needed to take in order to sell their product commercially which will bring them a greater profit than their current selling scenario.

The beekeepers rely on selling their honey to support their families and are forced to sell their product at any time they can, which results in them selling it to large companies who purchase the honey at a fraction of the price compared to the profit the beekeepers would be able to make if they were able to sell all of their honey in bottles under their own brand.

Lack of resources and equipment is another major problem that the organization faces. Many of the beekeepers do not have the proper equipment to clean and bottle the honey in a sanitary fashion. As a whole, the association has no central location where they can exercise sanitary practices in order to create a product that is approved by the Ministry of Agriculture and Livestock (MAG) in Costa Rica. The various members do not currently have the capital to a fund a new central location or purchase the proper equipment used to properly bottle their product. Without this central location, the members cannot obtain permits saying that their production process is sanitary and therefore they cannot commercialize and sell their products at grocery stores or other locations. This is a major problem because it causes them to sell their honey to larger companies at a lower price.

The final problem identified by the association's members is their lack of organization. Out of the nine members that we interviewed, only two kept a track of their finances and the other seven said they did not keep track. As stated in our Background Section, the organization formed eight years ago but was reformed in the last year. The lack of organization can mainly be explained by this new reformation and the lack of communication that they have. The organization faces many issues, but many members offered insight on how these problems could be resolved.

Figure 8. Members of APIGUACIMAL Contemplating the Issues of the Association

4.3.4 Solutions from the Beekeepers

Although the association faces many issues and problems in their current state, many of the members believe that there are solutions to their issues regarding communication, lack of resources, lack of information, financial pressure and organization.

Figure 9. Local Beekeeper of APIGUACIMAL During an Interview at His Apiary

First, they believe that being more committed to meetings and being more active in terms of conversing with each other will allow them to be more effective. Second, a loan from the government as well as technical support from the government are two major things that will allow them to purchase better equipment, a central location and become more effective producers. A central location is essential in their effort to commercialize because it will allow them to obtain sanitary permits from the MAG. These permits, along with a brand that they can put on their products will allow the association to become more organized and it will help them sell their products at a better price. Once the association has better communication and can be more effective with production, they will be able to make a larger profit in the long run. More importantly, they will be able to sell their product in grocery stores, tourist shops or wherever

they choose because they will have gained sanitary permits and a brand. Finally, all members must improve in their financial skills and the tools they use to keep track of their finances. Without these important techniques, it is extremely hard to tell what problems there are in the production process and what can be improved. All of these solutions are essential in the association's steps to commercialize and improve their current situation.

5.0 Deliverables

Below we have included our final deliverables. They are the proposal that the CCT will use to present their case to the Costa Rican government in order to attain funds and an excel file, which allows one to generate sale projections of honey based on several modifiable variables. These deliverables were translated to Spanish and given to the CCT.

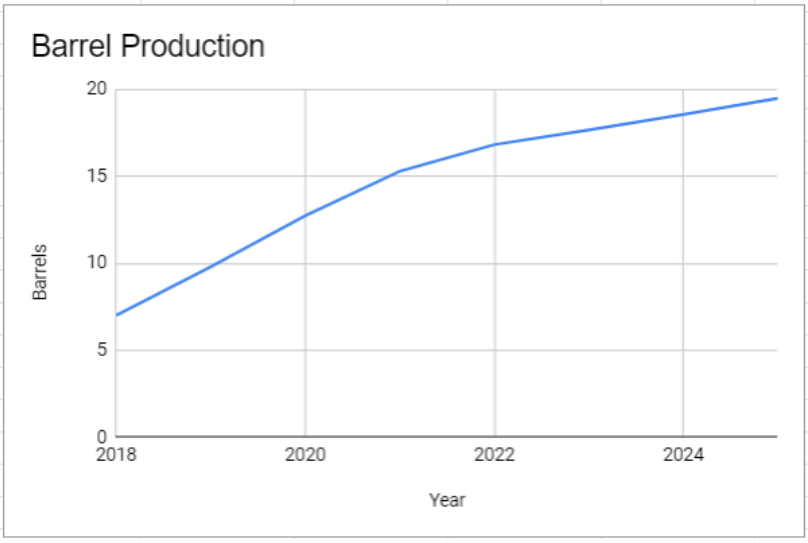
5.1 Cost Analysis

The excel file contains 4 sheets: a modifiable projection of sales that shows profit, an income statement of a theoretical beekeeper using the current process of beekeeping, a modifiable multi-year projected income statement for the proposed process, and a modifiable cash flow statement.

Below, Figure 10 shows the modifiable projection of sales. The percent increase every year, number of hives, percent of honey sold in bottles and barrels, price per bottle and barrel, and total expenses are modifiable. These will change the total revenue and profit that is projected. The percent increase determines the number of hives owned and in turn, the number of barrels produced every year. That number is then split into the amount of honey sold in barrels

and bottles. These numbers are multiplied by the price of each and added to find the total revenue.

Modifiable -->								
Year	**2018**		**2019**		**2020**		**2021**	
Percent Increase	--		40		30		20	
Number of Honey	70		98		127		153	
Price per Barrel/Bottle	725,000	4,000	725,000	4,000	725,000	4,000	725,000	4,000
Percent Sold in Barrels/Bottles	70	30	70	30	70	30	70	30
Number of Barrels Produced	7		10		13		15	
Quantity Sold per Barrel/Bottle	4.9	630	6.86	882	8.918	1146.6	10.7016	1375.92
Money Made per Barrel/Bottle	3,552,500	2,520,000	4,973,500	3,528,000	6,465,550	4,586,400	7,758,660	5,503,680
Total Revenue	6,072,500		8,501,500		11,051,950		13,262,340	
Total Costs		3,877,000		5,139,800		8,431,963		8,431,963
Net Profit (Colones)	2,195,500		3,361,700		2,619,987		4,830,377	
Net Profit (Dolares)	$3,659.17		$5,602.83		$4,366.65		$8,050.63	



2022		2023		2024		2025	
10		5		5		5	
168		177		185		195	
725,000	4,000	725,000	4,000	725,000	4,000	725,000	4,000
60	40	50	50	20	80	5	95
17		18		19		19	
10.09008	2018.016	8.82882	2648.646	3.7081044	4449.72528	0.973377405	5548.251209
7,315,308	8,072,064	6,400,895	10,594,584	2,688,376	17,798,901	705,699	22,193,005
15,387,372		16,995,479		20,487,277		22,898,703	
	9,581,111		10,270,600		10,649,818		11,047,998
5,806,261		6,724,879		9,837,458		11,850,705	
$9,677.10		$11,208.13		$16,395.76		$19,751.18	

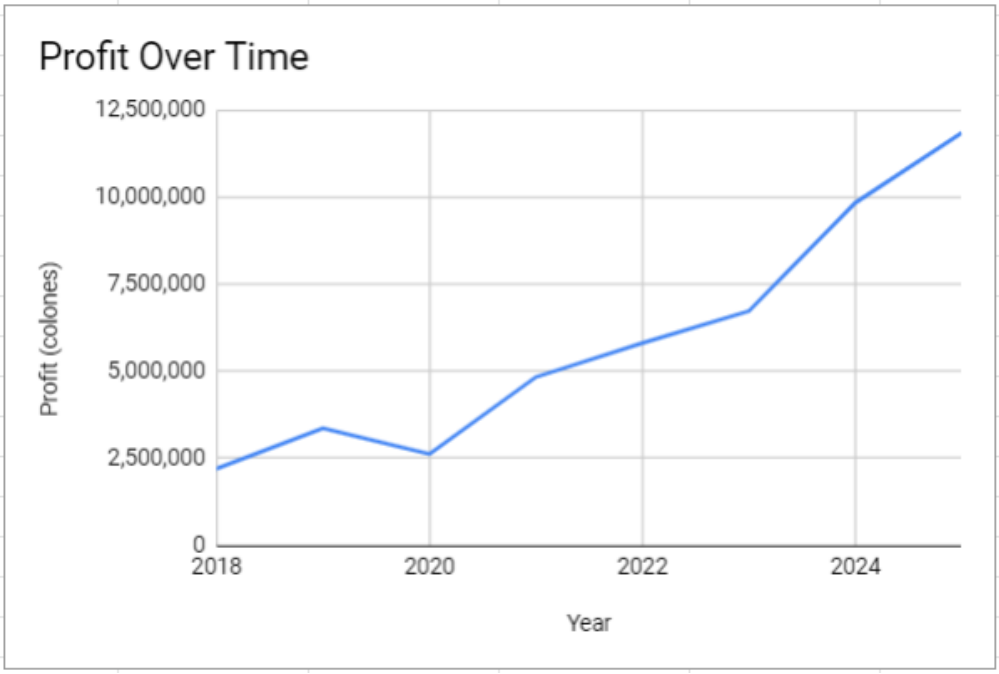


Figure 10. Production Projection

Below, Figure 11 shows the income statement of the average beekeeper in APIGUACIMAL as the process currently stands. We used the costs given to us by the beekeepers and made the following assumptions:

1. One beekeeper has an average of 63 hives
2. 10 hives produce 1 barrel of honey, so this beekeeper produces 7 barrels of honey

3. 70% of the honey produced is sold in barrels, so the beekeeper sells 5 barrels and 600 bottles of honey
4. A barrel is sold for 700,000 colones and a bottle is sold for 4,000 colones
5. Labor costs approximately 14,000 colones per hive
6. Sugar costs 2,625 colones per hive
7. ⅓ of queens are replaced every year and one queen costs 60,000 colones. Total number of queens replaced is 24 per year
8. Timol costs 900 colones per hive
9. Vitamins costs 2,400 colones per hive

	Income Statement (₡)	
Revenue		
	Revenue	5,900,000
	COGS	3,916,000
	Gross Profit	1,984,000
	Gross Margin %	33.63%
Operating Expenses		
	Labor	1,000,000
	Sugar	525,000
	Queens	1,440,000
	Timol (Medicine)	63,000
	Vitamins	168,000
	Transportation	720,000
	Total Operating Expenses	3,916,000
	Net Profit	1,984,000
	Profit Margin	33.63%

Figure 11. Current Beekeeper Income Statement

Below, Figure 12 shows the projected income statement of the average beekeeper under a brand up to the year 2025. We used the costs given to us by the beekeepers and made the following assumptions:

1. A bottle of locally-produced honey can sell for 7,000 colones
2. One beekeeper has an average of 70 hives
3. 10 hives produce 1 barrel of honey, so this beekeeper produces 7 barrels of honey
4. For the first year after getting a brand, 70% of the honey produced is sold in barrels, so the beekeeper sells 5 barrels and 600 bottles of honey. Each year after that, they sell increase their production.
5. A barrel is sold for 700,000 colones and a bottle is sold for 7,000 colones
6. The honey production will increase based on the first sheet

2020 (año de inversión)	
Estado de Resultados (₡)	
Ingresos - Revenue	
Ingresos	55,259,750
Precio - COGS	22,819,000
Beneficio Bruto - Gross Profit	32,440,750
Margen Bruto % - Gross Margin %	58.71%
Los Gastos de Operación - Operating Expenses	
Salarios	7,007,000
Azucar	3,675,000
La Reina	9,800,000
Timol	441,000
Vitaminas	1,176,000
Transportacion	720,000
Gastos Totales de Operación	22,819,000
Benificio Neto - Net Profit	32,440,750
Margin de Beneficio - Profit Margi	58.71%

2021	
Estado de Resultados (₡)	
Ingresos - Revenue	
Ingresos	66,311,700
Precio - COGS	31,414,923
Beneficio Bruto - Gross Profit	34,896,777
Margen Bruto % - Gross Margin %	52.63%
Los Gastos de Operación - Operating Expenses	
Salarios	9,109,100
Azucar	4,777,500
La Reina	12,740,000
Timol	573,300
Vitaminas	1,528,800
Transportacion	720,000
Loan Repayment	1,966,223
Gastos Totales de Operación	31,414,923
Benificio Neto - Net Profit	34,896,777
Margin de Beneficio - Profit Margi	52.63%

Figure 12. Multi-Year Projected Income Statement

Below, Figure 13 shows the final sheet includes a model for determining the rate of repayment for the loan given to the beekeepers. It was made with the assumption that the loan will come from the Costa Rican government, so the interest rate would be the rate set by the government. Additionally, if the cost structure changed from annual payments to semiannual, quarterly or monthly, there is a tool to help figure out what the applied interest rate would be. The numbers highlighted in yellow can also be modified so the CCT can determine what loan best works for the beekeepers.

Interest Rate Calculator				Loan Payment Calculation		
	Annual Interest Rate (%)	5.25%			Present Value of Loan	15000000
	Times compunded in a Year	12			Future Value of Loan	0
					Interest Rate (%)	5.25%
	Compounded rate (%)	5.38			Payments	10
					Payment Amount	**-1,966,222.79**

Figure 13. Loan Repayment Model

In addition to the income statement, the CCT wanted us to determine the Net Present Value (NPV) and Internal Rate of Return for this project. These are both indicators of profitability and will be taken into consideration when deciding if a project is worth investing in. For the determination of the Net Present Value the formula is:

$$NPV = \Sigma \quad {}_{t=0}^{n}\left(\frac{Rt}{(1+i)^{t}}\right)$$

Where *Rt* is the net cash inflow-outflows during a single period, *i* is the applied discount rate and *t* is the number of periods. Since we don't know the cost structure for repayments a series of assumptions will be made about the discount rate. The discount rate is the cost of borrowing money from a company, bank, government, etc. We are going to assume that funds for the beekeepers are going to be borrowed from the Costa Rican government and the loan repayments for the funds would happen yearly, therefore the applied annual discount rate would be 5.25%, as this is the current interest rate set by the Costa Rican government. However, if the loan structure were to be changed to semiannual payments, quarterly, or monthly, the applied discount rate would need to be adjust accordingly. The formula to adjust the discount rate accordingly is:

$$1 + i = \left(1 + \frac{i^{(m)}}{m}\right)^{m}$$

Where *i* is the annual interest rate and *m* represents the number of payment periods. Below is a chart showing the applied discount rates for different loan repayment structures:

Loan Repayment Structure	Applied Discount Rate
Annually	5.25%
Semi Annually	5.18%
Quarterly	5.15%
Monthly	5.13%

It is important to find the Net Present Value because it analyzes the profitability of a project. If the NPV is positive, the project would be considered profitable and suggests that it would be worthwhile to invest in because the projected earnings, in present dollars, generated by this project would exceed the anticipated costs. However, if the NPV is negative, then it would not be worthwhile to invest in because the projected earnings would be less than the anticipated costs, meaning the project would have a net loss.

To determine the Internal rate of return the formula is:

$$IRR = NPV = \Sigma \quad \frac{T}{t=1} \frac{Ct}{(1+i)^t} - C_0 = 0$$

Where *Ct* is the net cash inflow during the period t, C_0 is the total initial investment costs, *i* is the applied discount rate, and *t* is the number of time periods. When calculating the IRR, the Net Present Value is equal to zero because the factor being solved for is the interest rate (applied discount rate). The IRR is an important aspect of a project to find because will project the rate at which the project is expected to grow by and indicates how profitable the project ends up being. Generally speaking, the higher the IRR is, the more profitable and desirable it is to invest in the project, the lower the IRR the better it is to forgo or change the project. It is important to note that the IRR cannot be solved analytically but must be solved either by trial and error or through a software programmed to find the IRR.

5.2 Official Proposal for the CCT

Appendix C shows the proposal that the CCT will be using to prove the value of investing in the beekeepers. This will be submitted to the government in order to obtain funding for new equipment, land for a central harvesting plant, and permits to start a brand. The proposal has two main sections: market research and the economic and financial study.

Within the market research section of the proposal, we identified the current market area and supply, analyzed demand, and determined how viable a local honey brand would be. Within the economic and financial study, we determined all of the costs involved with our recommendations, conducted financial analysis, and calculated the total amount necessary for the loan and the costs associated with that (payback rate, interest, and interest recovery rate).

6.0 Recommendations

In this section we will discuss the recommendations we have produced after analyzing the topics discussed in our results and deliverables section. We presented our recommendations to the Guacimal Association of Beekeepers and the CCT in order for them to act upon our proposed course of action and follow through with creating the new value chain.

6.1 Recommendations for APIGUACIMAL

The first step the organization should take is to create a more formal form of record keeping in order to better keep track of their expenses, profits, and other financial information. This would better enable the APIGUACIMAL beekeepers to have a more organized cost

structure to better understand where their money is being spent, know how much profit they are making, and to identify any unnecessary expenses.

The second step that the association should take is to purchase an area of land where they will be able to create a centralized plant for cleaning and bottling their honey in sanitary containers. In order to purchase and build this plant, the association must receive capital from the government. With this influx of capital, the association can build a plant that has a room for extracting the honey, a room for bottling the honey, and a small office space and shop where they can keep administrative and financial records and sell the honey at this central location. Although this is a large investment for the association, the investment will be worthwhile due to the fact that they will be able to sell their honey at a higher price because they will no longer have to sell it in barrels to other honey producers. Eventually, they will be able sell all of their honey in one liter bottles. This will give the association more profit per gram of honey that they sell. A centralized location with a plant is highly recommended by our group in order to achieve the association's overall goals.

The third recommendation that our group has for APIGUACIMAL is to obtain sanitary health permits from the MAG. This is extremely critical for the association because without these permits, they will not be able to commercialize and sell their products in grocery stores or larger markets. In order to grant these permits, the MAG must receive a building plan of the location where they will be cleaning and bottling the honey. Once they receive this plan, they will visit the plant and determine if the conditions are sanitary or not. If the MAG deems the plant to be sanitary, the association will be able to put these sanitary permits on all the bottles of their product that they sell. This will allow the product to be purchased and sold by any enterprise without the enterprise having to worry that the MAG will come and take the honey

products off of their shelves. In order to truly commercialize, the association must first get a brand, then construct a centralized location for production, and finally obtain the sanitary permits from the MAG.

The final step that APIGUACIMAL should take in their effort to commercialize is to create a proper brand and logo for the entire association. A solidified brand will allow consumers to recognize the type of honey that they are purchasing and where it is coming from. A brand that can be associated with the quality honey that the organization produces is an essential marketing step that will help them increase their market size and allow them to sell their goods in a much easier fashion. Finally, it will show which beekeepers are official members of the organization and the brand will demonstrate that the association has been reestablished and is in good functioning condition. Obtaining a brand is an essential step in the association's efforts to commercialize.

6.2 Recommendations for Government Involvement

When interviewing the beekeepers, we asked what they thought would be most important for the government to know in order to for APIGUACIMAL to receive the best assistance possible. The beekeepers said the following would be most useful for the government to understand: acknowledge the importance of local producers to the economy, understand the importance of bees to the environment, and understand how giving support to a local brand would benefit the local community and the country as a whole.

The government can show that they are acknowledging the importance of both local producers and bees by demonstrating a vested interest in helping local beekeepers of their country. This can be done through the media or other outlets where they are able to portray the

importance of beekeepers to the country as they are helping pollinate the millions of crops and flowers that Costa Rica sells every year. Additionally, we recommend that the government invest in APIGUACIMAL's venture in order to jumpstart the value chain so that they can increase their production amounts and generate positive return on investment. The investment will help the beekeepers establish a central bottling center and receive permits in order to start their own brand of honey.

6.3 Recommendations for the CCT and Future Work

In order for APIGUACIMAL to grow and be successful, they will need some continued assistance from the CCT. First, our group recommends that the CCT try to organize meetings between local enterprises in Monteverde and the members of the association. This will allow the beekeepers to establish lasting relationships with the various businesses in Monteverde. We believe that these relationships will help the association because contracts or written agreements to buy the association's product and establish a partnership could be produced. This will allow the association to tap into the tourist market of Monteverde as well as create a consistent demand for their products.

Due to time constraints, our team was not able to obtain every piece of information pertaining to the possible creation of this honey product value chain. First, we were not able to interview all members of APIGUACIMAL and we recommend that the CCT interview any members that we did not talk to so that they have information from everyone in the organization. Due to the fact that not many financial records were kept and there did not seem to be a strong interest in keeping these records, we recommend that the CCT continue to educate and help the association in their efforts to improve their financial record keeping. It is very important that the

association begins to practice more efficient financial organization so that they have a better idea of how the business is running. This future work is critical to the development of APIGUACIMAL as a new business.

7.0 Conclusions

After completing our project, we have been able to come to several conclusions based on our findings and results. These conclusions are based on the demand for honey products in the Bellbird Biological Corridor, the responses from the individual beekeepers, the current and projected income statements that were created, and the overall feasibility of commercializing the association's products.

We determined that selling honey to only local businesses in Monteverde is not feasible for the amount of honey that is produced by the beekeepers. Because of this, it is crucial for the beekeepers to obtain funding from the government in order to build a proper bottling plant which will allow them to obtain the proper sanitation permits and establish a legitimate brand and nationwide distribution. While this is the most important aspect for the value chain's feasibility, APIGUACIMAL will also need to improve their organization and communication among their members to best utilize the investment from the government and ensure proper growth. With this investment and improvement in the organization of APIGUACIMAL, there should be an increase in the percentage of their honey sales in the years to come. This in turn will create the circular, sustainable, and local economy that the CCT has sought for.

References

Blum, N. (2008). Environmental education in Costa Rica: Building a framework for sustainable development? *International Journal of Educational Development, 28*(3), 348-358. doi:10.1016/j.ijedudev.2007.05.008.

CCT Costa Rica (2018). Project Management. Retrieved November 9, 2018, from http://www.cct.or.cr/contenido/our-programs/project-management/

Chaves, D. (2018, December 12). Skype interview.

Conducting a Feasibility Study. (2018). Retrieved November 9, 2018, from https://www.asha.org/practice/feasibility/.

Conservation, and Costa Rica. Retrieved December 10, 2018, from https://www.sesync.org/system/tdf/resources bellbird_corridor_teaching_notes_updated.pdf?file=1&type=node&id=2266&force=

Davis, S.F. (1999). *Sample Business Plan.* Retrieved from http://www.dcecodev.com/files/7314/1407/4235/SampleBusinessPlan.pdf

Dorada de la Bajura. (2017). Retrieved December 7, 2018, from https://www.mieldorada.net/propiedades/

El Corredor Biológico Pájaro Campana. (2018). Retrieved December 10, 2018, from http://www.cbpc.org/

Empresa de Inversiones Rosaval Ltda. Retrieved February 11, 2019, from http://roobycr.com/quienes_somos.html

Food and Agriculture Organization of the United Nations. Livestock Primary. Retrieved January 14, 2019, from http://www.fao.org/faostat/en/#data/QL

Gabrich, S. (2017, September 08). Beekeeping In Costa Rica Pura Vida – It's All Good. Retrieved from https://www.beeculture.com/beekeeping-costa-rica-pura-vida-good/

Helstrom, K. *How to Write a Projected Income Statement for a New Business.* Retrieved November 10, 2018, from https://yourbusiness.azcentral.com/write-projected-income - statement-new-business-1372 1.html

Instituto Costarricense de Turismo. (2017). Retrieved December 8, 2018, from https://www.ict.go.cr/es/

Kissinger, M. & Rees, W.E. Environ Dev Sustain (2010) 12: 547

Koens, J. F., Dieperink, C., & Miranda, M. (2009). Ecotourism as a development strategy: Experiences from Costa Rica. *Environment, Development and Sustainability 11*(6), 1225-1237. doi:10.1007/s10668-009-9214-3

Manza Té. Retrieved February 16, 2019 from https://www.esencialcostarica.com/empresas-licenciatarias/ alimentos /manza-te/

Mason, M. (2018). What Is Sustainability and Why Is It Important?. Retrieved December 5, 2018, from https://www.environmentalscience.org/sustainability

Menkhaus, S., & Lober, D. J. (1995, January 23). International Ecotourism and the Valuation of Tropical Rainforests in Costa Rica. Retrieved December 12, 2018, from https://pdfs.semanticscholar.org 8b29/97836f864cbdc664aca335abb9952172f014.pdf

Monteverde Costa Rica - Monteverde Cloud Forest. (2018). Retrieved from https://www.monteverdeinfo.com/cloud-forests

PAX NATURA – Peace with Nature. (2018). Retrieved December 6, 2018, from http://www.paxnaftura.org/

Penner, J., Gess, P., & Beckman, N. (2017). The Three-Wattled Bellbird: Corridor, Conservation, and Costa Rica (pp. 1-5, Rep.). SESYNC. Retrieved November 18, 2017, from https://www.sesync.org/system/tdf/resources/bellbird_corridor_teaching_notes_ updated.pdf?file=1&type=node&id=2266&force=.

Reh, F. J. (2018, February 13). How to Read a Company's Income Statement. Retrieved from https://www.thebalancecareers.com/how-to-read-an-income-statement-2275103

Save the Bees. (2018). Retrieved November 9, 2018, from https://www.greenpeace.org/usa/sustainable-agriculture/save-the-bees/

Spivak, M., Batra, S., Segreda, F., Castro, A. L., & Ramírez, W. (1989). Honey production by Africanized and European honey bees in Costa Rica. *Apidologie, 20*(3), 207-220. doi:10.1051/apido:19890303

Stark, M. (2018, July 18). Can Costa Rica Save Its Bees? *The Tico Times*. Retrieved from http://www.ticotimes.net/2018/07/18/can-costa-rica-save-its-bees

The Three Pillars of Sustainability. (2014) Retrieved November 29, 2018, from http://www.thwink.org/sustain/glossary/ThreePillarsOfSustainability.htm

The World Bee Project. (2018) The Global Crisis. Retrieved from http://worldbeeproject.org/global-crisis-1/

Three-Wattled Bellbird Biological Corridor Council. (2018). Retrieved from https://monteverde-institute.org/biological-corridor-council.html

Thompson, A. (2005). Entrepreneurship and Business Innovation. Retrieved November 19, 2018, from http://www.tetrisrealtygroup.com/wp-content/uploads/2012/03/Business_Feasibilsibility_Study_Outline.pdf

UN University. (2011, December 7). Ethics and Environmentalism: Costa Rica's Lesson. Retrieved December 2, 2018, from https://ourworld.unu.edu/en/ethics-and-environmentalism-costa-ricas-lesson

What is Ecotourism? (2018, December). Retrieved December 10, 2018, from http://www.ecotourism.org/what-is-ecotourism

Appendix A: Interview Script Used for Restaurants, Hotels, and Tourist shops in Monteverde

For Restaurants:

1. Do you buy honey products?
    a. **¿Su empresa compra productos de miel?**
2. If yes, What type of honey products do you buy?
    a. **¿Cuales son los tipos de productos del miel que comparar?**
3. How much honey product do you buy per month?
    a. ¿En que cantidad compraron productos del miel cada mes?
4. How much do you pay for one kilo of honey?
    a. ¿Cuánta paga por un kilo de miel?
5. Who provides your honey products?
    a. ¿Quién proporciona sus productos de miel?
6. How do you find your providers?
    a. ¿Cómo busca sus proveedores?
7. How does the product get to you?
    a. ¿Que es el proceso para obtener el producto del proveedor?
8. What kinds of honey products do you buy most?
    a. ¿Cuales tipos de productos de miel has comprado más?
9. What percentage of your honey products are from local producers?
    a. ¿Qué porcentaje de sus productos de miel son de productores locales?
    b. What are the obstacles to increasing this percentage?
        i. ¿Cuales son los obstáculos para aumentar este porcentaje?
10. What are the obstacles that you face in getting local honey to your store?
    a. ¿Cuales son los obstáculos que se encuentra cuando tiene que recibir productos de miel a su restaurante?
11. Do you think demand for product changes during the year?
    a. ¿Cree que demanda por productos de miel cambia durante el año?
    b. If yes, what months and how much?

i. **¿En cuales meses y cuánto?**

12. What impact does tourism have on buying patterns for honey products?
    a. **¿Qué impacto tiene el turismo en los patrones de compra de productos de miel?**
    b. Do you think tourists are more likely to buy locally produced products?
        i. **¿Piensa que es más probable que los turismos compraría productos locales?**
13. Would you be interested in buying locally produced products made through sustainable processes?
    a. **¿Estarías interesado en comprar productos locales hechos de prácticas sustentables?**
14. If they dont buy honey locally, why not
    a. **¿Si no compras miel, porque no?**
15. If they are buying locally, what can be improved.
    a. **¿Si está comprando localmente, que puede mejorar de esta proceso?**
16. What do you make with the honey products
    a. **¿Que cocina con miel?**

If restaurant answered no to buying honey products

1.) If no, what are the reasons why you do not buy honey products?
    a.) **¿Cuales son las razones por las que no compra productos de miel?**
2.) Would you be interested in buying locally produced products made through sustainable processes?
    a.) **¿Estarías interesado en comprar productos locales hechos de prácticas sustentables?**

For Hotels:

1.) Do you buy honey products?

   a.) ¿Usted compra productos de miel?

2.) If yes, What type of honey products do you buy?

   a.) ¿Cuales son los tipos de productos del miel que comprar?

3.) How much honey product do you buy per month

   a.) ¿En qué cantidad compraron productos de miel cada mes?

4.) How much do you pay for one kilo of honey?

   a.) ¿Qué paga por un kilo de miel?

5.) Who provides your honey products?

   a.) ¿Quién proporciona sus productos de miel?

6.) How do you find your providers?

   a.) ¿Cómo busca sus proveedores?

7.) How does the product get to you?

   a.) ¿Cómo recibe su producto de miel?

8.) What kinds of honey products do you buy most?

   a.) ¿Cuales tipos de productos de miel has comprado más?

9.) What percentage of your honey products are from local producers?

   a.) ¿Qué porcentaje de los productos de miel son de productores locales?

   b.) What are the obstacles to increasing this percentage?

      i.) ¿Cuales son los obstáculos para aumentar este porcentaje?

10.) What are the obstacles that you face in getting local honey to your hotel?

   a.) ¿Cuales son los obstáculos que se encuentra para obtener miel local a la hotel de usted?

11.) Do you think demand for product changes during the year?

   a.) ¿Piensa que demanda por los productos de miel cambia durante el año?

   b.) If yes, what months and how much?

      i.) ¿En cuales meses y cuánto?

12.) What impact does tourism have on buying patterns for honey products?

   a.) ¿Qué impacto tiene el turismo en los patrones de compra de productos de miel?

b.) Do you think tourists are more likely to buy locally produced products?

i.) ¿Piensa que es más probable que los turismos compraría productos locales?

13.) Would you be interested in buying locally produced products made through sustainable processes?

a.) ¿Estaría interesado en comprar productos producidos localmente a través de procesos sostenibles?

14.) Do you sell honey products?

a.) ¿Usted vende productos de miel?

If hotel answered no to buying honey products

1.) If no, what are the reasons why you do not buy honey products?

a.) ¿Cuales son las razones por las que no compra productos de miel?

2.) Would you be interested in buying locally produced products made through sustainable processes?

a.) ¿Estaría interesado en comprar productos producidos localmente a través de procesos sostenibles?

For Tourist Shops:

1. Do you buy honey products?
    a. **¿Usted compra productos de miel?**
2. If yes, What type of honey products do you buy?
    a. ¿Cuales son los tipos de productos del miel que comparar?
        i. If no, what are the reasons why you do not buy honey products?
            1. Cuales son las razones porque no los compras?
3. How much honey product do you buy per month?
    a. ¿En que cantidad compraron productos del miel cada mes?
4. How much do you pay for one kilo of honey?
    a. ¿Cuánta paga por un kilo de miel?
5. How much do you sell one unit of honey for?
    a. **¿Cuanta se vende por un cosa de miel?**

6. Who provides your honey products?
    a. **¿Quién proporciona sus productos de miel?**
7. How do you find your providers?
    a. **¿Cómo busca sus proveedores?**
8. How does the product get to you?
    a. **¿Que es el proceso para obtener el producto del proveedor?**
9. What kinds of honey products do you buy most?
    a. **¿Cuales tipos de productos de miel has comprado más?**
10. What percentage of your honey products are from local producers?
    a. **¿Qué porcentaje de sus productos de miel son de productores locales?**
    b. What are the obstacles to increasing this percentage?
        i. **¿Cuales son los obstáculos para aumentar este porcentaje?**
11. What are the obstacles that you face in getting local honey to your store?
    a. **¿Cuáles son los obstáculos que se encuentra cuando tiene que recibir productos de miel a su locación?**
12. Do you think demand for product changes during the year?
    a. **¿Cree que demanda por productos de miel cambia durante el año?**
    b. If yes, what months and how much?
        i. **¿En cuales meses y cuánto?**
13. What impact does tourism have on buying patterns for honey products?
    a. **¿Qué impacto tiene el turismo en los patrones de compra de productos de miel?**
14. Do you think tourists are more likely to buy locally produced products?
    a. **¿Cree que es más probable que los turismos compraría productos locales?**
15. Would you be interested in buying locally produced products made through sustainable processes?
    a. **¿Estarías interesado en comprar productos locales hechos de prácticas sustentables?**

Appendix B: Interview Results from Businesses

Business Names	1. ¿Usted compra productos de miel?	2. Si compra productos de miel, ¿Compra productos de miel locales?	3. Si compra productos de miel locales, ¿Que se puede mejorar?	4. Si no compra productos de miel locales, ¿Por qué?	5. ¿Cuales son los tipos de productos del miel que comprar?	6. ¿En qué cantidad compraron productos de miel cada mes?
MTV Cloud Forest	Si a un productor local cuando produce	Si a un productor local cuando produce	Nada hasta el momento porque es de buena calidad	N/A	Miel de abeja	un galon por mes
Hotel Belmar	Si	No	N/A	Por falta de comuicacion y contacto con productores locales	Miel en botella	En botella
Hotel Bellbird	Si	Si	N/A	N/A	Miel de abeja	3-4 botellas cada ano
Stella's Bakery	Si	Si	N/A	N/A	Miel de abeja	2 galones por mes
Monteverde Coffee Center	Si	No	N/A	N/A	Miel de abeja	500 g whenever they run out
Choco Cafe	Si	Si	N/A	N/A	Miel de abeja	Buys 5 galons at a time whenever they need it
Dolce Aroma	Si	Si	N/A	N/A	Miel de abeja	1 botella por mes
Marlene's Trail Foods	Si	Si	N/A	N/A	Miel de abeja	Galon whenever she needsd it
Panderia Jimenez	Si	Si	N/A	N/A	Miel de abeja	2 botellas cada mes
Cafe Escondido	Si	No	N/A	Doesn't use a lot	Miel de abeja	Very little
Monteverde Wholefoods	Si	No	N/A	Used to buy from Guacimal, but honey got taken off of shelves by el MAG due to lack of sanitation sticker.	Miel de abeja	N/A
Heliconia						
Ficus						
MTV Country Lodge	Si					
Orchid Coffee Shop	Si					
El Establo	No	N/A	N/A	N/A	N/A	N/A
Cafe Cabure	Si	Si	Not very easy to find/get. No sanitation sticker from el MAG	N/A	Miel de abeja	1 bottle whenever they need it
Selina Monteverde						
Woods Bakery & Coffee Shop	Si (Luis' wife is head chef)					

Business Names	7. ¿Qué paga por un kilo de miel?	8. ¿Quién proporciona sus productos de miel?	9. ¿Cómo busca sus proveedores?	10. ¿Cómo recibe su producto de miel?	11. ¿Cuales tipos de productos de miel has comprado más?	12. ¿Qué porcentaje de los productos de miel son de productores locales?	13. ¿Cuales son los obstáculos para aumentar este porcentaje?
MTV Cloud Forest	20,000 por galon	Eduardo Rodriguez (cuando es la temporada)	Recomendacion	Ellos lo entregan a Domicillo	N/A	N/A	Ese es el gasto
Hotel Belmar	4,200 por botella	Distribuidora Belca	A travez de una seria de politicas y directrices formuladas para la sostenibilidad en la empresa	En nuestras instalaciones	Ningunos	0%	Falta de conocieminto sobre posibles productores locales
Hotel Bellbird	3000-4000 por botella	APIGUACI	They come to hotel every month	Brought to him or buys in supermarket	N/A	50%	N/A
Stella's Bakery	20,000 por galon	APIGUACI	N/A	N/A	N/A	N/A	N/A
Monteverde Coffee Center	N/A	Supermarket	N/A	Buys at supermarket	N/A	0%	N/A
Choco Cafe	20,000 por galon	Fabio y Luis (APIGUACI)	N/A	Go to farm and buy it there	N/A	100%	N/A
Dolce Aroma	4,500 por botella	APIGUACI	N/A	N/A	N/A	N/A	N/A
Marlene's Trail Foods	20000-25000 por galon	APIGUACI	Worker lives in Guacimal	N/A	N/A	N/A	N/A
Panderia Jimenez	4,000	APIGUACI	N/A	Beekeepers come to bakery	N/A	N/A	N/A
Cafe Escondido	N/A	Supermarket	N/A	N/A	N/A	N/A	N/A
Monteverde Wholefoods	N/A	N/A	N/A	Buys at supermarket	N/A	N/A	N/A
Heliconia							
Ficus							
MTV Country Lodge							
Orchid Coffee Shop							
El Establo	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cafe Cabure	4000 por botella	APIGUACI		She buys it at their farms	NA	NA	NA
Selina Monteverde							
Woods Bakery & Coffee Shop							

Business Names	14. ¿Cuales son los obstáculos que se encuentra para obtener miel local a la hotel de usted?	15. ¿Piensa que demanda por los productos de miel cambia durante el año?	16. En caso afirmativo, ¿En cuales meses y cuánto?	17. ¿Qué impacto tiene el turismo en los patrones de compra de productos de miel?	18. ¿Piensa que es más probable que los turismos compraría productos locales?	19. ¿Estaría interesado en comprar productos producidos localmente a través de procesos sostenibles?
MTV Cloud Forest	La temporada, en el verano se produce, en el invierno no	No	N/A	N/A	N/A	N/A
Hotel Belmar	Ninguno	Actualmente	Temporada baja (septiembre-octubre) una reduccion a un 50% de lo comunmente adquirido	Depende de los sub productos propuestos	Si la empresa comunica esto de forma acertiva y eficiente, si	Si
Hotel Bellbird	N/A	N/A	N/A	N/A	N/A	Si
Stella's Bakery	N/A	N/A	N/A	N/A	N/A	Si
Monteverde Coffee Center	N/A	N/A	N/A	N/A	N/A	Si
Choco Cafe	N/A	N/A	N/A	N/A	N/A	Si
Dolce Aroma	N/A	N/A	N/A	N/A	N/A	Si
Marlene's Trail Foods	N/A	N/A	N/A	N/A	N/A	Si
Panderia Jimenez	N/A	N/A	N/A	N/A	N/A	Si
Cafe Escondido	N/A	N/A	N/A	N/A	N/A	Si
Monteverde Wholefoods	N/A	N/A	N/A	N/A	N/A	Si
Heliconia						Si
Ficus						
MTV Country Lodge						
Orchid Coffee Shop						
El Establo	N/A	N/A	N/A	N/A	N/A	Si
Cafe Cabure	NA	NA	NA	NA	NA	Si
Selina Monteverde						
Woods Bakery & Coffee Shop						

Appendix C: Interview Script for Members of APIGUACIMAL

Personal introduction and interview script below:

Hola somos estudiantes de una universidad que se llama Worcester Politécnica Instituto de los Estados Unidos. Estamos trabajando con el Centro Científico Tropical para hacer una investigación y mejorar el proceso de la producción de miel de los apicultores locales.

Estamos trabajando para determinar la factibilidad de una cadena de valor de productos de miel local. Estas preguntas serán utilizadas para crear una propuesta para mostrar que invertir en apicultores locales pueden mejorar la economía y apoyar empresas locales. Tenemos algunas preguntas sobre la miel que produce y cómo la vende.

Información Personal:

1. What is your name? Age?
    a. **¿Cómo se llama? ¿Su edad?**
2. How many people are in your family?
    a. **¿Cuántas personas están en su familia?**
3. How long have you been a beekeeper?
    a. ¿Cuántos años ha sido apicultor?
4. Do you have any other job(s)?
    a. ¿Tiene otros trabajos?
5. Do you work with other beekeepers on your farm?
    a. ¿Trabaja con otros apicultores en su finca?
6. How long have you been a part of the APIGUACIMAL?
    a. ¿Por cuánto tiempo has sido miembro de la asociación de Guacimal?
7. Can you provide a brief history of the association?
    a. ¿Puede decirnos una breve historia de la asociación?
8. Do you know when the association was formed?
    a. ¿Cuándo se formó la asociación?
9. Do you know why the association was formed?
    a. ¿Por qué se formó la asociación?

10. Why did you become a member?
    a. **¿Por qué se hizo un miembro?**
11. What are the advantages of being a member of the association?
    a. **¿Cuáles son las ventajas de ser miembro de la asociación?**
12. Are there any disadvantages of being a member of the association?
    a. ¿Cuáles son las desventajas de ser miembro de la asociación?
13. Overall, how does the association function as a group? (ask some follow up here: how do they meet, how often, how do they communicate, what do they discuss, legal status "personeria juridica".)
    a. ¿En general, cómo funciona la asociación?
        i. ¿Cuantas veces se reunir en un año?
        ii. ¿Como habla con los otros apicultores?
        iii. ¿De qué hablan cuando se reunir?
        iv. ¿Qué es la personería jurídica de la asociación?
14. What aspects of the association can be improved?
    a. ¿Cuáles aspectos de la asociación puedan mejorar?

<u>Investigación de Mercado:</u>

15. What is the current state of the bee honey market in Costa Rica?
    a. ¿Cómo es el estado de actual del mercado de miel de abeja en general en Costa Rica en su opinión?
16. How has this changed overtime?
    a. ¿Cómo ha cambiado esto con el tiempo?
17. How much competition is there in the bee honey market in your region?
    a. ¿Cuánta competencia hay en el mercado de la miel de abeja en su región?
18. Do you sell certain products more than others?
    a. ¿Vende productos específicos más que otros productos?
19. Who do you sell your honey products to?
    a. ¿Quienes son sus compradores?
20. Do you sell to one specific group more than another?
    a. ¿Vende a un grupo específicos más que otros grupos?

21. How do you sell your products?
    a. **¿Cómo vende sus productos?**
22. Where do you sell your products?
    a. **¿De dónde vende sus productos?**
    b. Mostly local or out of the region?
        i. **¿Vende en la región local o no?**
23. How much do you sell it for?
    a. **¿Cuánto vende su miel por?**
24. Does the cost of the product vary based on where you sell to?
    a. **¿Hay variedad en el precio de miel que vende?**
25. Do you see any benefits in selling locally?
    a. **¿Ve positivos en vender sus productos locales?**
26. What are the biggest challenges you face in selling honey and bee honey products?
    a. **¿Cuáles son los obstáculos grandes que se encuentra en la venta de la miel y los productos de la miel?**
27. What do you think would be the most helpful solutions to these challenges?
    a. **¿Qué piensa que serían las soluciones más útiles a estos problemas?**
28. Do you have any special marketing techniques to better sell your products?
    a. **¿Tiene técnicas de publicidad que mejorar sus ventas de productos?**

Producción:

29. Can you talk us through the honey production process at your farm throughout a year?
    a. **¿Puede contarnos sobre el proceso de producción de la miel en su finca en un año?**
30. How does production process change during the year?
    a. What conditions change your productions? (pesticides, climate change, defloration, …)
31. What products do you produce?
    a. **¿Cuáles son los productos que producen?**
32. How much of those products do you produce in a year?
    a. **¿Cuántos productos se produce en un año?**

33. How much honey do you sell?
    a. **¿Qué cantidad de miel usted vende?**
34. How often do you harvest honey to sell?
    a. **¿Con qué frecuencia cosecha productos para vender?**
35. How many beehives do you have and where are they?
    a. **¿Cuantas colmenas tiene y dónde están?**
36. Do you have your own farm/land for production or do you share with other beekeepers?
    a. **¿Tiene una finca o tierra personal o compartes con otros apicultores?**
37. Is there a specific time of year where you produce more or less?
    a. **¿Hay un tiempo específico del año que produce más o menos productos?**
38. Can you tell us about how the queen bee affects the entire hive and honey production?
    a. **¿Puede decirnos cómo la abeja reina afecta la colmena y la producción de la miel?**
    b. Where do you get this queen?
        i. **¿De dónde compra la abeja reina?**
    c. How much does it cost to buy the queen?
        i. **¿Cuantos cuestan para comparar la abeja reina?**
39. What are the biggest challenges you face in producing honey and bee honey products?
    a. **¿Cuáles son los obstáculos grandes que se encuentra en la producción de la miel y los productos de la miel?**
40. What do you think would be the most helpful solutions to these challenges?
    a. **¿Qué piensa que serían las soluciones más útiles a estos problemas?**
41. Do you keep track of finances (profit, costs, etc)?
    a. **¿Hace un registro de las finanzas o otros números?**
42. Can you talk us through your expenses and cost structure?
    a. **¿Puede decirnos sobre sus gastos y su estructura de costo?**
43. How do you decide the prices of your honey?
    a. **¿Cómo decide sus precios de su miel?**
44. Has the government done anything to help local beekeepers? Have they shown any interest in doing so?

a. **¿El gobierno ha hecho algo para ayudar a los apicultores locales? ¿Han mostrado algún interés ayudar a los apicultores locales?**
b. What would you like them to know so that they can better understand your situation and assist you?
    i. **¿Qué información le gustaría que el gobierno conocer para que puedan comprender mejor su situación y ayudarlo?**

Appendix D: Final Proposal Given to the CCT

El Centro Científico Tropical

Propuesta Para Determinar la Viabilidad de una Cadena de Valor de Miel de Abeja en el Corredor Biológico de Bellbird

1. 1.0 Fondo
2. 2.0 Objetivos Generales
3. 3.0 Beneficiarios
    a. La Asociación de Apicultores de Guacimal
4. 4.0 Actividades a realizar
    a. 4.1 Investigación de mercado
        i. 4.11 Producto colocado en el mercado.
        ii. 4.12 Análisis de la oferta.
        iii. 4.13 Competencia
        iv. 4.14 Análisis de la demanda.
        v. 4.15 Marketing y Promoción.
    b. 4.2 Estudio económico y financiero.
        i. 4.21 Recursos financieros y de capital requeridos
        ii. 4.22 Preparación del flujo de caja y todas las suposiciones sobre el peso
        iii. 4.23 Valor presente neto del proyecto
5. 5.0 Conclusiones y recomendaciones.
    a. 5.1 Recomendaciones para APIGUACIMAL
    b. 5.2 Opiniones de los miembros de APIGUACIMAL
6. Citas y Referencias

1.0 Fondo

Hace tres años, un grupo de estudiantes de WPI desarrolló el Programa de Responsabilidad Social Corporativa (RSC) para el Central Cientifico Tropical (CCT). Uno de los objetivos de este programa era fortalecer las cadenas de valor locales en el Corredor Biológico de Bellbird.

El Corredor Biológico Bellbird en Costa Rica conecta el hábitat de la vertiente del Pacífico desde el Golfo de Nicoya a la división continental, protegiendo las rutas de migración y la biodiversidad (Three-Wattled Bellbird, 2018). El corredor abarca el Bosque Nuboso de Monteverde, un importante destino turístico en Costa Rica. El CCT es parte de la iniciativa del corredor y también trabaja para la responsabilidad social corporativa (RSE) y el desarrollo socioeconómico sostenible en los corredores biológicos.

Un segundo grupo de estudiantes de WPI trabajó en el análisis de costos y distribución para entregar productos directamente a los compradores de Monteverde. El análisis incluyó el volumen necesario de productos, opciones de transporte y costos, logística y frecuencia.
Este año, el CCT desea el apoyo de los estudiantes para determinar la factibilidad de hacer una nueva cadena de valor con productos de miel de abeja tanto dentro del Corredor Biológico Bellbird como a nivel nacional. El objetivo de este proyecto, y como resultado esta propuesta, es mejorar el proceso de producción de los apicultores locales en Guacimal. Queremos hacer esto ayudando a la asociación de apicultores a construir un lugar central de recolección de miel, para que puedan recibir permisos del Ministerio de Agricultura y Ganadería (MAG) y desarrollar una marca para vender miel debajo.

2.0 Objetivos Generales

Los objetivos generales de esta propuesta son mostrar los análisis técnicos, financieros y administrativos preparados por nuestro equipo. Estos análisis ayudaron a determinar la viabilidad de una cadena de valor para los productos de miel de abeja. Más específicamente, nuestro equipo realizó una investigación de mercado y preparó un estudio económico y financiero para determinar la viabilidad de la cadena de valor.

3.0 Beneficiarios

Figura 1. Los apicultores locales

Los beneficiarios de esta propuesta son la Asociación de Apicultores de Guacimal. Guacimal es un pequeño pueblo rural a aproximadamente 45 minutos de la Reserva de Nubes de Monteverde y la cercana ciudad de Santa Elena. Sirve como la ubicación central de la Asociación de Apicultores de Guacimal, también conocida como APIGUACIMAL, que proviene del nombre en español del grupo, Los Apicultores de Guacimal. APIGUACIMAL se fundó en 2013 porque los apicultores locales en el área vieron la oportunidad de crear una organización que podría obtener más ayuda del gobierno, ayudar a su comunidad y ayudarse entre sí.

4.0 Investigación de mercado

4.11 Producto colocado en el Mercado y Área de Mercado.

El principal producto que se comercializará es la miel de las abejas. Actualmente, este es el único producto importante que la asociación podrá introducir en el mercado. Algunos subproductos futuros creados por este producto incluirían artículos como cera de abeja, propóleo y cosméticos hechos de miel, como lociones, cremas y chapitas. Debido a que la miel es un producto único, no hay muchos productos complementarios que estén directamente relacionados con el precio de la miel. La miel es el principal producto que se comercializará, tiene una gran cantidad de subproductos, pero actualmente no tiene productos complementarios.

El área de mercado para los productos de abejas de miel incluye a la mayoría de Costa Rica, pero para este proyecto nuestro grupo pudo identificar un mercado local. A través de nuestra investigación, encontramos que actualmente existe una gran demanda en el Corredor Biológico de Bellbird. El Corredor se extiende desde el hábitat de la vertiente del Pacífico entre el Complejo de la Reserva de Monteverde a lo largo de la división continental y los manglares costeros del Golfo de Nicoya ("Three-Wattled Bellbird", 2018). En la Figura 1 a continuación, un mapa del BBCP muestra el tamaño y la geografía del corredor ("El Corredor Biológico Pájaro Campana", 2018).

Figura 2. Bellbird Biological Corridor, CCT (2018)

El Corredor cubre un área de aproximadamente 165,000 acres e incluye las cuencas hidrográficas de tres ríos diferentes (Penner, Gess y Beckman, 2017).

Cuando APIGUACIMAL está considerando la colocación del producto y la introducción de la miel en el mercado, hay tres factores clave que deben tener en cuenta para tener una introducción exitosa. Primero, debe haber una mirada en profundidad a los competidores potenciales y cualquier producto similar que pueda considerarse como un sustituto del producto que se está introduciendo. Después de identificar quién es la competencia, es importante revisar sus estrategias de mercado y evaluar cómo la miel de APIGUACIMAL es diferente y mejor que la de los competidores. A continuación, es importante identificar quiénes son los clientes objetivo y descubrir cómo hacer que su marca sea más atractiva para ellos porque la mayoría de los clientes que serán seleccionados comprarán productos similares o sustitutos. Por lo tanto, es importante determinar si las características de ser orgánico, producidas de manera sostenible, etc., son importantes para los clientes porque podrían ayudar a distinguir APIGUACIMAL de

otras marcas. Por último, APIGUACIMAL debe definir sus estrategias de marketing y probar su enfoque de mercado. El marketing es un factor importante a considerar, ya que fomentará el conocimiento de la marca y ayudará a aumentar las ventas (Stein, Farmer, Domenz, Martin, Anghel, & Cohen, 2018). APIGUACIMAL necesita encontrar una estrategia que funcione mejor para su producto y área y tener en cuenta las plataformas a las que se dirigirá su mercadotecnia, cómo mostrarán su miel, cómo se diseñará el paquete de la miel y el aspecto de las etiquetas. . Después de decidir sobre la estrategia y el aspecto de sus productos, deben tener un grupo de enfoque o mesa redonda para obtener comentarios sobre su estrategia a fin de crear el diseño más atractivo para los consumidores.

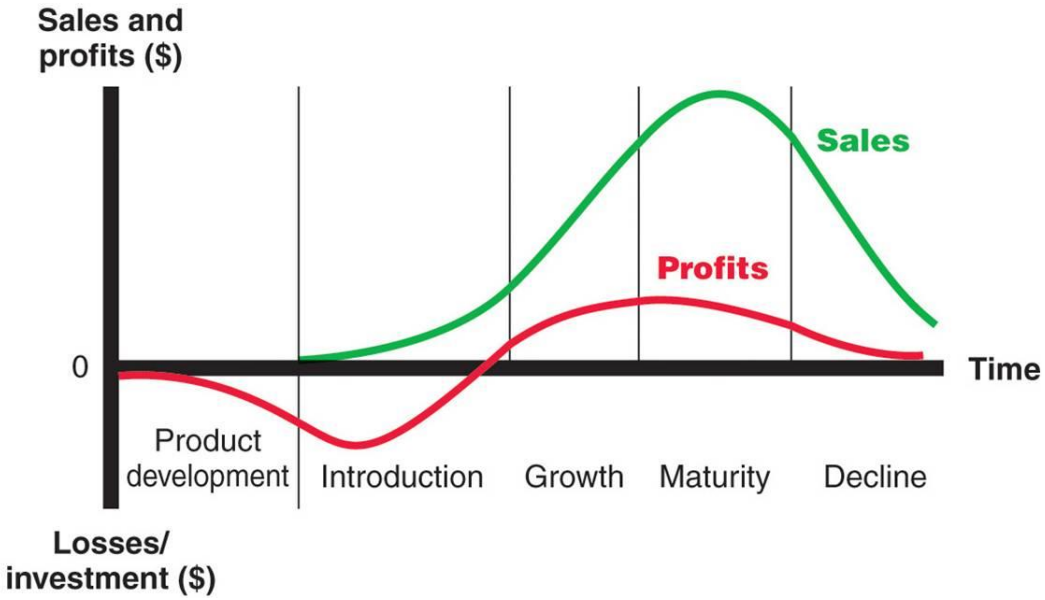


Figura 3. Ciclo de vida del producto, Marketing Insider (2018)

La Figura 3 anterior demuestra el crecimiento futuro anticipado de la nueva cadena de valor. Para alcanzar el punto de las ganancias positivas, APIGUACIMAL primero requerirá la asistencia del gobierno en forma de una inversión monetaria para superar el desarrollo del producto y las etapas de introducción. Entonces podrán ver un crecimiento en su empresa y promover su economía local.

4.13 Análisis de la oferta.

Con el fin de conocer mejor el mercado de la miel en Costa Rica, utilizamos un banco de datos de las Naciones Unidas para recopilar información sobre la cantidad de producción de miel desde el 2010 hasta el 2016. Aunque no se dispone de datos más recientes más allá del 2016, pudimos obtener Información valiosa para ayudarnos a comprender mejor el mercado actual de la miel de Costa Rica en general. Nuestro equipo también realizó una investigación sobre los precios actuales de varias marcas de miel que se ofrecen en el mercado hoy en día. A través de la investigación que completamos, pudimos discernir tendencias importantes en el mercado global de la miel y encontrar el costo promedio por gramo de miel de las diferentes marcas que se encuentran en los supermercados. Luego utilizamos estos costos promedio para compararlos con la miel que venden los agricultores locales para determinar un rango de precios factible en el que puedan vender su producto y ser competitivos en el espacio del mercado.

Al realizar una investigación de mercado utilizando la Organización de Alimentos y Agricultura (FAO) de la base de datos estadísticos de las Naciones Unidas, comparamos los cambios en la cantidad de miel producida en toneladas entre los años 2010 y 2016. De las comparaciones, encontramos que comenzaron con el año En 2012, se observó una tendencia a la baja en la cantidad de miel producida en Costa Rica hasta el año 2014. Durante este tiempo, la cantidad producida por año pasó de 1,300 toneladas a alrededor de 750 toneladas. Pero luego, a partir de 2014, la producción comenzó a aumentar constantemente hasta 2016, cuando la producción se estancó en poco más de 1,100 toneladas por año. La siguiente tabla muestra los datos recopilados (“Food and Agriculture Organization”, 2016).

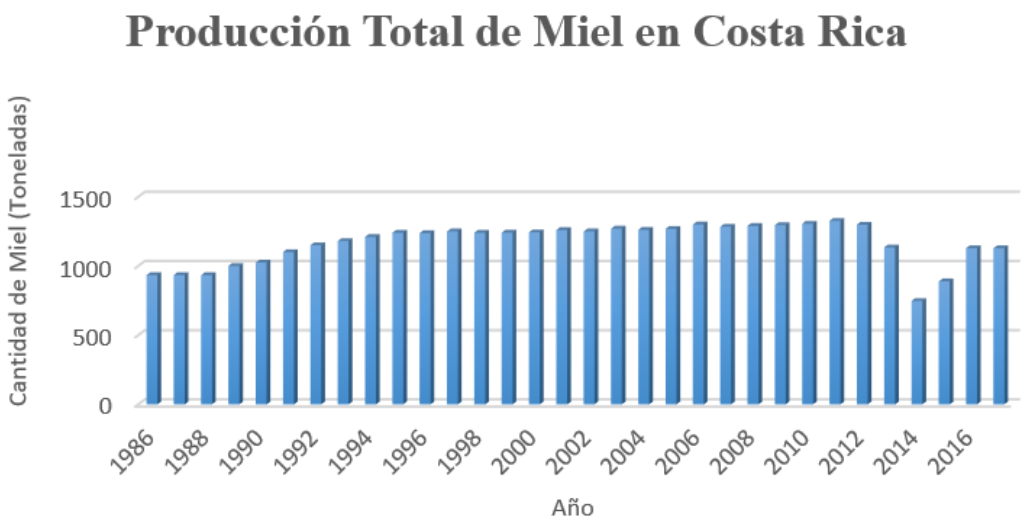


Figura 4. Producción de miel en Costa Rica.

Al utilizar la Organización de Alimentos y Agricultura (FAO) de la base de datos estadísticos de las Naciones Unidas, también pudimos comparar el cambio en la importación de miel en toneladas de los años 2010 a 2016. A medida que disminuye la producción de miel en Costa Rica, la importación de miel aumentado. El siguiente gráfico muestra que la importación de miel se triplicó con creces de 2010 a 2016. En 2010, el país importó 100 toneladas de miel. En 2016, ese número aumentó a 335 toneladas.

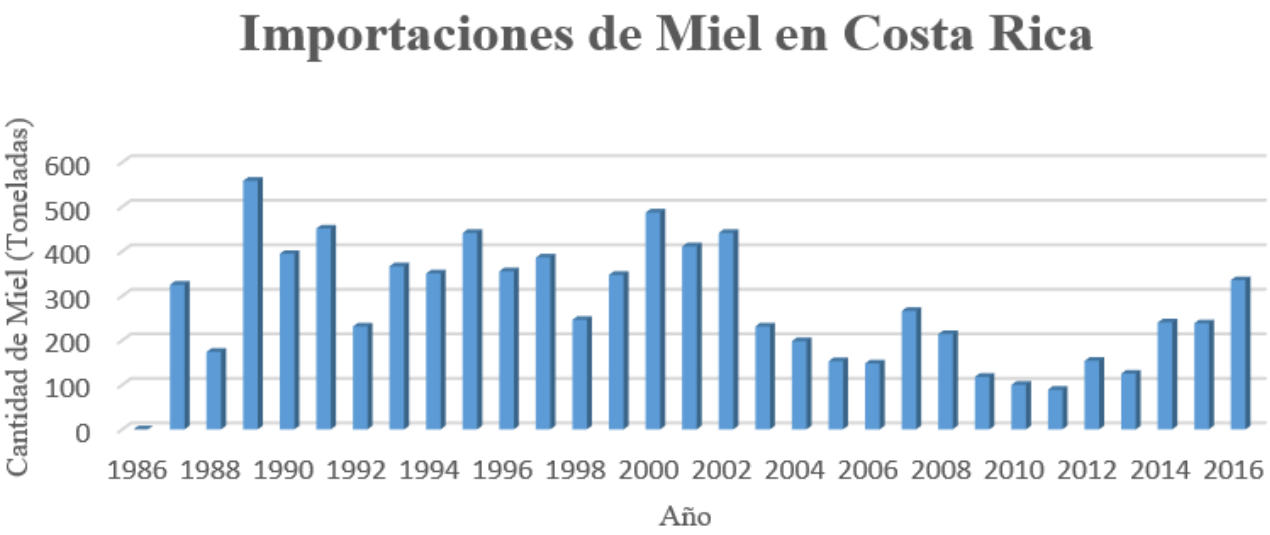


Figura 5. Importaciones de miel en Costa Rica.

A través de nuestras entrevistas con miembros de APIGUACIMAL, recibimos datos sobre su producción, que incluyen: número de colmenas, número de barriles producidos, número de barriles que venden, número de botellas que venden y precios de sus productos. Existe una gran variación en la cantidad de miel que produce cada apicultor, cómo los apicultores venden su miel y a quién se la venden. La Figura 6 a continuación muestra los datos recopilados. La información aún se está recopilando.

Nombre	# Apiarios	# Colmenas	# Estns. Producen	# Estns. que vendan	# Estns. vendidos en bot.	# Bot. que vendan	% Que Vendan en Estan.
Leonel Solis Cruz	7	140	15	9	6	1800	60%
Eduardo Solis Cruz	5	90	12	12	0	0	100%
Marvin Villalobos Sibaja y Danilo Mendez Chavarria	3	70	8	2	6	1800	25%
Fabio Mendez Villalobos	3	50	5.5	1	4.5	1350	18%
Carlos Cruz	5	70	6	4	2	600	67%
Victor Fernandes Mora	1	13	1.25	0	1.25	380	0%
Roman Cruz Solis	2	22	3	3	0	0	100%
Luis Angel Ramirez Mendez	6	90	9	8	1	300	89%
Geraldo "Lalo" Cruz							
Victor Hugo, Luis Roberto, Leonel, Eduardo	1	25	3.3	3.3	0	0	100%
Ricardo Uribe							
Roberto y Moises Arguello	5	60	6	1	5	1500	17%
Lupe Cruz							
Freddy Cruz							
Promedio - Mean	3.80	63.00	6.91	4.33	2.58	773.00	57.54%
Intervalo - Range	1 - 7	13 - 160	3 - 17	1 - 12	0 - 6	0 - 2100	0 - 100%
Desviación Estándar - Std Dev	2.10	38.42	4.23	3.99	2.53	758.04	0.40
Total	38	630	69.05	43.3	25.75	7730	

Figura 6. Datos de producción de APIGUACIMAL.

Como se muestra en la figura anterior, la cantidad de colmenas que posee cada apicultor y la cantidad de miel producida, varía ampliamente entre los apicultores. La cantidad total de miel producida y vendida es de 69.05 estañones o 20,715 kg de miel. Los apicultores pueden vender toda la miel que producen, pero los métodos de venta también varían ampliamente entre los apicultores. Algunos venden toda su miel en botellas, lo que lleva a un precio más alto por kilogramo para su miel. Otros venden toda su miel en barriles, lo que produce un precio más bajo por kilogramo. La mayoría vende tanto en barriles como en botellas, pero existe una variación en cuanto a la cantidad que venden de cada uno.

En el estado actual, el producto se entrega de dos maneras diferentes. De una manera, los diversos apicultores venderán su producto entregándolo a cualquier consumidor que esté interesado en comprar miel. La otra forma en que se entrega su producto es cuando los consumidores visitan sus respectivas granjas y compran el producto directamente allí. Actualmente, la asociación tiene muy pocos clientes debido a que no se han comercializado. Sin

embargo, algunos clientes actuales de la asociación incluyen cafés en Monteverde que regularmente compran miel a la asociación. Los futuros clientes de la asociación podrían ser más restaurantes y empresas en el Corredor Biológico de Bellbird, así como varias tiendas de comestibles en el Corredor. No hay cartas de intención ni contratos para comprar el producto, pero todas las empresas que nuestro grupo entrevistó en Monteverde dijeron que estarían interesadas en comprar productos producidos localmente.

A través de los datos recopilados de los seis supermercados que visitamos, pudimos comparar los precios de 12 marcas diferentes para los productos de miel de abeja que se venden. Nuestro equipo encontró el precio promedio en colones por gramo para las 12 marcas diferentes de miel que se venden en cada supermercado donde se encontraron los productos de miel. A partir de estos datos, pudimos ver qué marca era la más cara por gramo, el rango de precio por gramo y la consistencia de los precios en los supermercados. A continuación se muestra una tabla con nuestros resultados de los datos que recopilamos de los supermercados que visitamos.

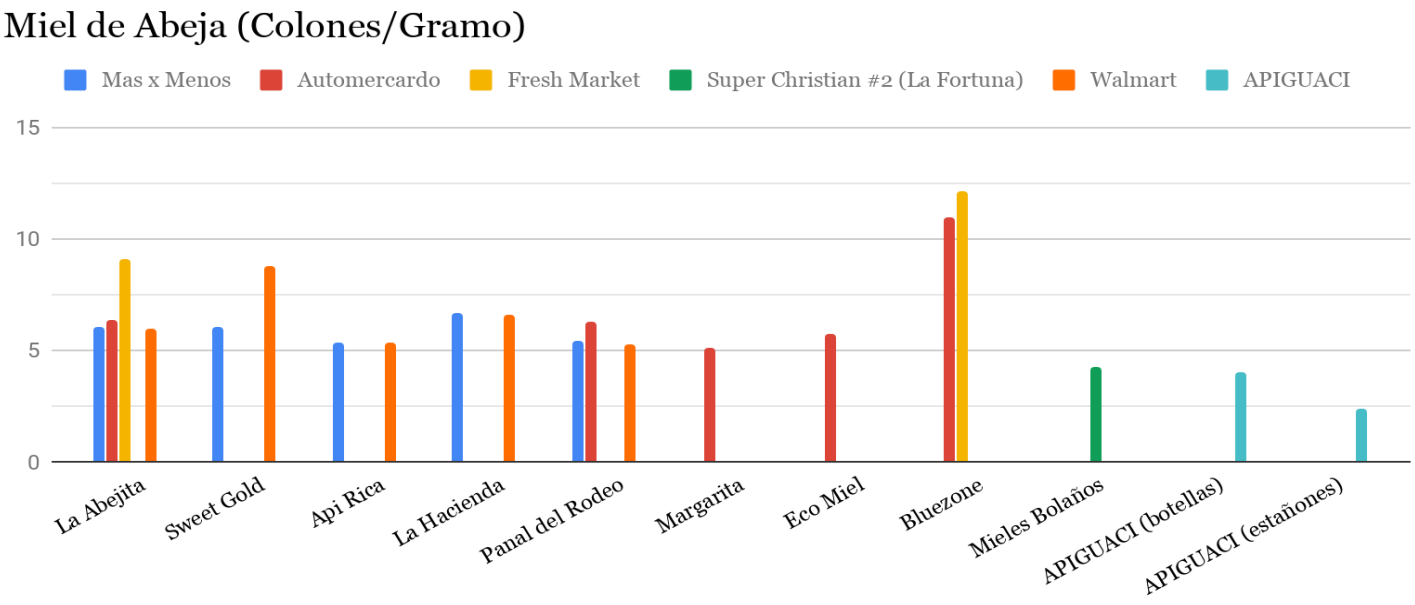


Figura 7. Marcas establecidas de miel y puntos de precio.

Esta tabla muestra que la marca de miel más cara por gramo fue Bluezone que se encuentra en Fresh Market y que el gramo de miel más barato es la miel de APIGUACIMAL. Además, este gráfico también muestra que la mayoría de los precios de miel por gramo se mantienen constantes en todas las marcas y en varios supermercados. Es evidente que la oferta de miel en Costa Rica es fuerte, debido a la gran variedad de marcas de miel que los consumidores pueden comprar en los supermercados.

4.14 Competencia

Al analizar el comportamiento actual de la oferta de los apicultores, había muy pocos proveedores conocidos en el área de mercado fuera de la asociación. En el estado actual, la asociación suministra su miel a dos compañías importantes en Costa Rica. El primero se llama Manza Té. Manza Té es una gran empresa costarricense que ofrece una amplia variedad de productos de alimentos y bebidas. Lleva 45 años en el mercado. Su marca de miel, La Abejita, es una de las marcas de miel más grandes de Costa Rica ("Manza Té", n.d.). La segunda empresa se llama Rosaval. Rosaval es, "un grupo comercial dedicado a la importación, envasado, elaboración y distribución de productos alimenticios en el mercado nacional". La empresa se inició en 2004 y es una empresa más pequeña que Manza Té con solo 20 trabajadores (“Empresa de Inversiones Rosaval ", Nd). El grado de competencia entre estas dos compañías no parece ser muy fuerte, ya que ambas están comprando miel de la asociación a cuatro mil colones por botella de miel.

Al analizar la competencia en el mercado actual de la miel de abeja, encontramos dos productos de naturaleza similar a la miel de abeja y podrían utilizarse como sustitutos. Actualmente, son azúcar y jarabe de maíz. Ambos pueden sustituirse en áreas como los

edulcorantes en bebidas y en la preparación de alimentos. Además, hay otras marcas de miel de abeja con las que APIGUACIMAL tiene que lidiar. A partir de ahora, los más grandes contendientes y proveedores del mercado de la miel en Costa Rica, Manza Té y Rosaval. Manza Té y Rosaval son los principales compradores de APIGUACIMAL y mezclarán la miel de APIGUACIMAL con la miel importada de otros países de América Central, como Nicaragua, Guatemala y El Salvador, creando un producto de miel de menor calidad. En cuanto a la ubicación, Rosaval y Manza Té no están cerca de los miembros de APIGUACIMAL. Rosaval se encuentra a 300 metros al norte de Liceo León Cortés, San Roque de Grecia, aproximadamente a una hora de San José, y Manza Té está ubicado dentro de la ciudad de San José. En términos de productos, tanto Manza Té como Rosaval ofrecen miel de abeja. Además, Manza Té vende otros productos que varían desde paquetes de té, bebidas a base de hierbas, especias y bebidas especiales. Rosaval ofrece una amplia selección de productos alimenticios que incluyen salsas, productos de Yuca, bebidas en polvo, frijoles, especias y condimentos, masa y refrescos. También hay otras marcas más pequeñas de miel, como La Hacienda y Margarita, que venden otros productos de abeja como el propóleo y el polen. Mientras que Manza Té es el nombre principal de la compañía que vende miel, la marca Manza Té vende su miel bajo se llama La Abejita, y Rooby es la marca por la cual Rosaval vende su miel bajo. Las otras marcas más pequeñas que encontramos fueron Sweet Gold, Api Rica, La Hacienda, Panal del Rodeo, Margarita, Eco Miel, Bluezone y Mieles Bolaños. Luego de realizar una investigación de mercado en San José y Monteverde, encontramos que el precio promedio en colones por gramo de las otras marcas de miel mencionadas anteriormente se vende a un precio más alto que el de la miel APIGUACIMAL. A continuación se muestra un gráfico que muestra el precio por gramo en colones de las marcas de la competencia. APIGUACIMAL (verde) produjo miel al precio más

bajo por gramo a 4 colones / gramo. Bluezone, una marca que produce miel natural local de Nicoya tiene un precio de 11.54 colones / gramo. Los precios de las otras marcas van desde 4.27 a 7.41 colones / gramo. Esto demuestra que pueden aumentar sus precios y seguir siendo competitivos, especialmente como una marca local de miel natural.

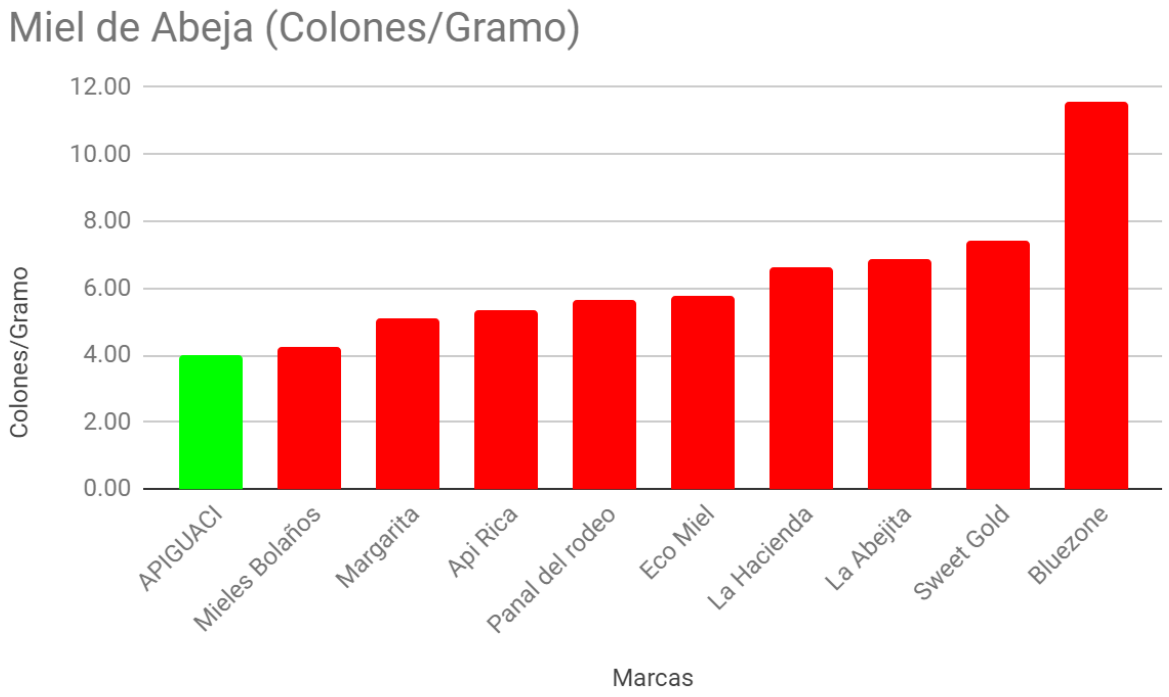


Figura 8. Precio promedio por gramo de marcas de miel establecidas

Hay muchos factores que determinan el comportamiento de suministro para la organización. Estos factores incluyen: la ubicación de las colmenas, el clima o el clima donde se guardan las colmenas y la calidad de la tecnología que tiene la asociación. La ubicación de las colmenas tiene un efecto directo sobre el suministro debido al hecho de que deben ubicarse cerca de una fuente de agua. Sin esta fuente de agua, las abejas lucharán con la producción y la oferta sufrirá. El clima de las colmenas también es muy importante. Si el área de producción no tiene un suministro fuerte de flores u otros cultivos, las abejas no tendrán una cantidad adecuada de elementos para polinizar. Una disminución en la floración en el área resultará en una

disminución en la producción de las colmenas. Por lo tanto, el clima del área de producción es esencial en el comportamiento de la oferta. Finalmente, la calidad de la tecnología es muy importante para determinar el comportamiento de suministro. Una parte importante de la producción de las colmenas es la abeja reina. Sin una abeja reina joven y fuerte, la producción no florecerá. Además, la asociación actualmente carece de muchas formas de tecnología que les permita desinfectar completamente y embotellar sus productos. La ubicación de las colmenas, el clima en el área y la calidad de la tecnología son factores que determinan el comportamiento de suministro. En 2018, la estimación de la oferta actual de la organización es de aproximadamente 69 barriles de miel o 20,700 kilogramos.

4.15 Análisis de la demanda.

Según el Fondo Comunitario de Monteverde, Monteverde tiene una población de 6,000 habitantes y recibe aproximadamente 150,000 turistas en 2016 ("Monteverde Costa Rica", 2019). El Consejo Mundial de Viajes y Turismo informó que hizo un 5.1% del PIB de Costa Rica en 2016 y espera que este porcentaje aumente en un 4.7% entre 2017-2027 (Turner & Freiermuth, 2017). Debido a estas tendencias, esperamos que un aumento similar en el turismo en la región de Monteverde sea proporcional al de toda la nación debido a que Monteverde es un destino turístico importante en el país. Aunque la demanda de empresas locales en Monteverde no es lo suficientemente grande como para satisfacer la oferta de la asociación, la asociación tiene una gran demanda que se extiende desde Guacimal hasta la península de Nicoya. Los mercados a lo largo del corredor están vinculados y si la asociación puede comercializar, entonces deberían poder encontrar la cantidad correcta de demanda que se corresponda con su oferta. Los posibles consumidores de la asociación incluyen:

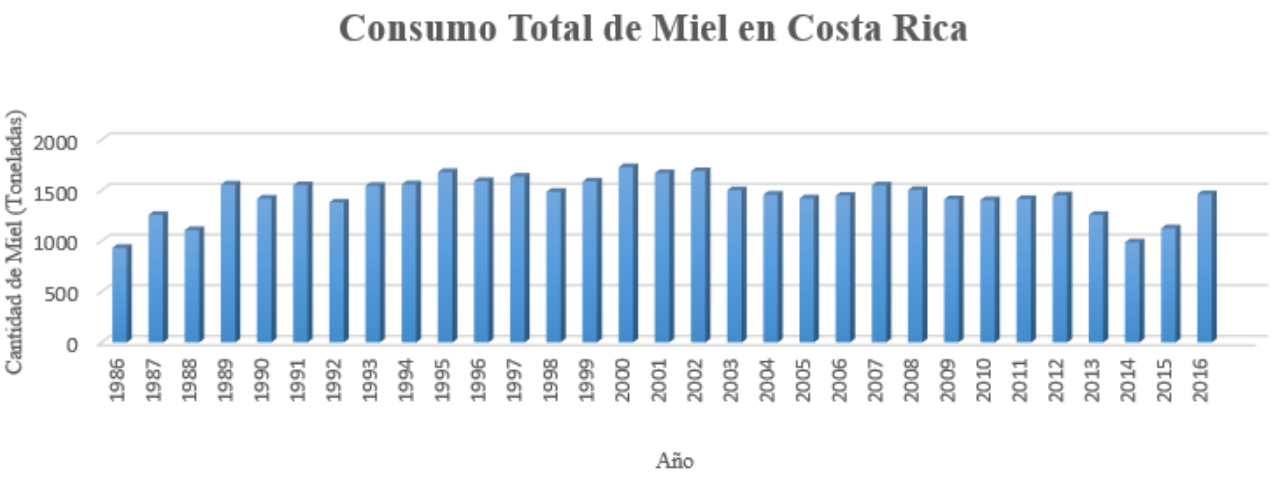
- Miembros de su comunidad local en Guacimal y pueblos de los alrededores.

- Supermercados en todo el Corredor Biológico Bellbird
- Empresas a lo largo del Corredor Biológico Bellbird.
- Hay muchos factores que determinan el comportamiento de la demanda, que incluyen:
- Gustos y preferencias de los consumidores destinatarios.
- Ingresos de consumidores actuales y potenciales.
- Cambios en los precios de los bienes relacionados.
- Número de consumidores en el mercado (Singh, 2016)

A través de nuestras entrevistas con empresas en Monteverde, se llegó a la conclusión de que los habitantes de Costa Rica se centran en el sabor y la calidad de diversos productos. Esto es evidente en el mercado del café así como en el mercado de la miel de abeja, ya que hay una multitud de marcas entre las que los consumidores pueden elegir. Muchos consumidores tienden a preferir una marca en particular sobre otras una vez que identifican la que les gusta, por lo que si el producto de la asociación se identifica como un producto de calidad, entonces se destacaba claramente entre los consumidores. Los ingresos de los consumidores serán importantes para la asociación en Monteverde. Monteverde es un centro de turismo en Costa Rica y muchos turistas tienen un ingreso disponible más alto que la población de Costa Rica ("Instituto Costarricense de Turismo", 2017). Esto permitirá a la asociación aumentar los precios de sus productos en Monteverde porque podrá ser satisfecha por los turistas en el área. Los cambios en los precios de los bienes relacionados también determinarán el comportamiento de la demanda. Finalmente, el número de consumidores en el mercado afectará directamente el comportamiento de la demanda de productos de miel.

Para analizar completamente la demanda de miel en Costa Rica, creamos un análisis de crecimiento histórico para mostrar la demanda actual y futura de la miel en el país. Los gráficos

para la producción total de miel y la cantidad total de miel importada se muestran en la sección Análisis del suministro. Para encontrar la demanda actual de miel en el país, nuestro equipo combinó la producción total de miel con la cantidad total de miel importada para ver si la demanda de miel estaba aumentando o disminuyendo. La figura 9 a continuación muestra el consumo total de miel en Costa Rica desde 1986. Al crear una línea de mejor ajuste en este gráfico, nuestro equipo pudo determinar que el consumo total de miel en Costa Rica ha aumentado en un promedio de 23.952 toneladas. por año. Por lo tanto, está claro que el mercado



de la miel ha seguido expandiéndose y podemos predecir una expansión lineal en el futuro.

Figura 9. Consumo total de miel en Costa Rica, Organización de las Naciones Unidas para la Agricultura y la Alimentación (2016)

A través de la investigación de mercado que realizamos, se compararon los precios de 12 marcas de miel ya existentes. Estos datos se recopilaron para ayudar a determinar un punto de precio justificado para vender la miel de la nueva cadena de valor. La siguiente tabla compara el precio de los colones por gramo de miel para cada una de las diferentes marcas. Actualmente,

APIGUACIMAL vende su miel a 4000 colones por 1000 gramos, lo que equivale a 4 colones por gramo de miel. Como se muestra en la tabla, este precio es el más barato en comparación con el resto de las marcas que se ofrecen actualmente. Si APIGUACIMAL puede vender su producto en las tiendas de comestibles, recomendamos que venden la miel por 7 colones por gramo. Esto lo convertirá en uno de los productos más caros del mercado, pero también será uno de los productos más excelentes en lo que respecta a la calidad.

4.16 Marketing y Promoción

El marketing y la promoción son esenciales para cualquier negocio nuevo que esté entrando en un área de mercado. Más específicamente, la producción de miel con fines de lucro depende de una comercialización exitosa que requiere un plan organizado. Según la Facultad de Ciencias Agrícolas de la Universidad Estatal de Pennsylvania en los Estados Unidos, un plan de mercadeo organizado para los productos de miel de abeja contendrá lo siguiente:

- Producción de miel de alta calidad.
- Envases y etiquetas atractivos.
- Un programa de publicidad eficaz.
- Servicio confiable para los clientes.

Todos estos pasos son posibles para que la asociación los logre y su éxito dependerá en gran medida de las estrategias de comercialización que adopten (Frazier, Greaser, Kelsey y Harper, 2001).

Actualmente, los productos de miel de abeja disponibles en la actualidad no son muy diferentes entre sí, aparte de los contenedores y las etiquetas y sus diferentes diseños. Algunos ejemplos de estos diseños se pueden ver a continuación.

Figura 10. Marcas actuales de miel.

Para interrumpir el espacio del mercado, recomendamos a APIGUACIMAL crear una marca y un logotipo refinados que se destaquen entre los competidores actuales. Además, las botellas deben contener información sobre de dónde proviene específicamente la miel. Dicha información podría incluir la ubicación, el nombre y la edad del apicultor, un hecho interesante sobre su granja de miel, así como el hecho de que la miel se ha producido naturalmente con una práctica sostenible. Dicha estrategia de marketing permitirá a APIGUACIMAL acelerar el crecimiento de su producto dentro del mercado actual de la miel y separarse de los competidores.

Sobre la base de la información recopilada, hemos llegado a la conclusión de que tal empresa es completamente viable si los apicultores locales de APIGUACIMAL pueden obtener apoyo y respaldo financiero del gobierno. Hemos incluido los pasos específicos que se deben tomar para que la nueva cadena de valor tenga éxito.

4.2 Estudio económico y financiero

4.21 Recursos financieros y de capital requeridos

Esta sección resume todos los recursos financieros y de capital de trabajo necesarios para la implementación y operación del proyecto.

El capital de trabajo consiste en los recursos financieros necesarios para iniciar la operación del proyecto. Esta cantidad debe cubrir los costos durante el período cuando no hay ingresos suficientes para permitir la sostenibilidad del proyecto.

Hemos estimado que el presupuesto para el proyecto es _____. Esto proviene de los siguientes costos estimados necesarios para el proyecto:

- Terreno: ____
- Costo de construcción: ____
- Equipo: ____
- Precio del Permiso: ____
- ...

Recomendamos que el CCT realice una investigación adicional sobre estos costos para determinar el préstamo exacto que se necesita.

Será necesario obtener financiamiento del gobierno para recibir permisos, iniciar la marca y comprar mejores equipos. Después de esa inversión inicial, no habrá otra necesidad de financiamiento externo porque se espera que los apicultores obtengan suficientes ganancias cada año para mantener el negocio. Los apicultores ya poseen colmenas para las abejas y tienen conocimiento del proceso de apicultura. Debido a esto, no habrá costos iniciales asociados con los proyectos, ya que los apicultores ya tienen las herramientas necesarias para producir miel. Con este presupuesto propuesto, el costo promedio por usuario es ____. Se espera que cada

apicultor haga ____ al año.

4.22 Preparación del análisis financiero y todos los supuestos de peso

En esta sección, se realiza un análisis financiero y se resumen los supuestos considerados.

El análisis financiero es la hoja de cálculo de Excel que se adjunta a este documento y consta de cuatro hojas separadas: producción proyectada, estado de ingresos proyectados de varios años, estado de ingresos actuales y una estructura de pago de préstamos.

La primera hoja muestra una proyección de producción y cómo eso afectará los ingresos, gastos y ganancias de APIGUACIMAL.

La segunda hoja está destinada a dar una visión más detallada de las finanzas de la asociación. Muestra los costos, ingresos y ganancias netas hasta el 2025.

La tercera hoja muestra la cuenta de resultados actual de un apicultor. Se realizó utilizando el número medio de colmenas y costes. Esto ayuda a comprender la situación actual de los apicultores y la mejora que podrían tener con este préstamo.

La hoja final es una herramienta para ayudar al CCT a decidir el mejor monto de reembolso para el préstamo otorgado a los apicultores. Se hizo con el supuesto de que el préstamo provendrá del gobierno de Costa Rica, por lo que la tasa de interés sería la tasa establecida por el gobierno. Además, si la estructura de costos cambia de pagos anuales a semestrales, trimestrales o mensuales, existe una herramienta para ayudar a determinar cuál sería la tasa de interés aplicada.

Al completar este análisis financiero, hicimos las siguientes suposiciones:

- La producción aumentará cada año.
- El mercado de la miel continuará creciendo, por lo que habrá suficiente demanda para el

aumento de la oferta.

- La producción será de buena calidad y la asociación no dará permisos a otros apicultores que no estén en la asociación.
- Toda la miel que se produce será vendida a través de la marca.
- El precio del producto es atractivo para los locales.
- La asociación recibirá pleno apoyo del gobierno.

4.23 Valor neto actual del proyecto, tasa interna de retorno y período de recuperación de la inversión

Esta sección determina cómo encontrar el Valor Presente Neto (VAN), la Tasa Interna de Retorno (TIR) y la tasa de descuento para la estructura de reembolso de préstamos esperados de los fondos asignados a los apicultores de APIGUACIMAL del gobierno de Costa Rica. Además, esta sección también explica por qué es importante calcular la TIR y el VAN y la importancia de los datos proporcionados a partir de estos dos factores.

Para la determinación del Valor Presente Neto la fórmula es:

$$NPV = \Sigma \quad {}^{n}_{t=0}\left(\frac{Rt}{(1+i)^{t}}\right)$$

Donde *Rt* es el flujo neto de salida de efectivo durante un solo período, *i* es la tasa de descuento aplicada y *t* es el número de períodos (Jagerson, 2018). Como no conocemos la estructura de costos para los reembolsos, se realizarán una serie de suposiciones sobre la tasa de descuento. La tasa de descuento es el costo de pedir dinero prestado a una empresa, banco, gobierno, etc. Asumiremos que los fondos para los apicultores serán prestados por el gobierno de Costa Rica y que los reembolsos de los préstamos de los fondos se realizarán anualmente. por lo tanto, la tasa de descuento anual aplicada sería de 5.25%, ya que esta es la tasa de interés actual establecida por el gobierno de Costa Rica (Interest Rate | America, 2019). Sin embargo, si

la estructura del préstamo se cambiará a pagos semestrales, trimestrales o mensuales, la tasa de descuento aplicada tendría que ajustarse en consecuencia. La fórmula para ajustar la tasa de descuento en consecuencia es:

$$1 + i = (1 + \frac{i^{(m)}}{m})^m$$

Donde *i* es la tasa de interés anual y *m* es el número de períodos de pago. A continuación se muestra un cuadro que muestra las tasas de descuento aplicadas para diferentes estructuras de pago de préstamos:

Estructura de pago	**Tasa de descuento aplicada**
Anualmente	5.25%
Semi anualmente	5.18%
Trimestral	5.15%
Mensual	5.13%

Figura 11. Ejemplo de estructuras de reembolso de préstamos

Es importante encontrar el Valor Actual Neto porque analiza la rentabilidad de un proyecto. Si el VPN es positivo, el proyecto se consideraría rentable y sugiere que valdría la pena invertir porque las ganancias proyectadas, en dólares actuales, generadas por este proyecto excederán los costos anticipados. Sin embargo, si el VPN es negativo, entonces no valdría la pena invertir porque las ganancias proyectadas serían menores que los costos anticipados, lo que significa que el proyecto tendría una pérdida neta.

Para determinar la tasa interna de retorno la fórmula es:

$$IRR = NPV = \Sigma \quad {}^{T}_{t=1} \frac{Ct}{(1+i)^t} - C_0 = 0$$

Donde *Ct* es la entrada de efectivo neta durante el período t, C_0 es el costo total de la inversión inicial, *i* es la tasa de descuento aplicada y *t* es el número de períodos de tiempo (Hayes, 2019). Al calcular la TIR, el valor actual neto es igual a cero porque el factor que se está resolviendo es la tasa de interés (tasa de descuento aplicada). La IRR es un aspecto importante de un proyecto que se debe encontrar, ya que proyectará la velocidad a la que se espera que crezca el proyecto e indica qué tan rentable es el proyecto. En términos generales, cuanto más alto es el IRR, más rentable y deseable es invertir en el proyecto, cuanto más bajo es el IRR, mejor es renunciar o cambiar el proyecto. Es importante tener en cuenta que la IRR no se puede resolver analíticamente, sino que se debe resolver por prueba y error o mediante un software programado para encontrar la IRR (Hayes, 2019).

Para determinar el Período de Recuperación de la Inversión, se harán las siguientes suposiciones. Primero, después de que el gobierno de Costa Rica preste los fondos a APIGUACIMAL, APIGUACIMAL comenzará a pagar el préstamo en el próximo período de pago, es decir, de inmediato. A continuación, esa APIGUACIMAL tendrá montos de pago fijos a lo largo de la duración del préstamo. La última suposición que se está haciendo es que la tasa de interés (tasa de descuento aplicada) se fijará por la duración del préstamo y para este proyecto asumimos 4 tasas de interés diferentes, una tasa anual, una tasa semestral, una tasa trimestral y una tarifa mensual.

La fórmula para encontrar el período de recuperación de la inversión es:

$$n = ln[(1 - \frac{Pv(r)}{P})^{-1}] \div ln(1 + r)$$

Donde *n* es el número de períodos, *Pv* es el valor presente del préstamo, *r* es la tasa de interés aplicada y *P* es el monto de pago (Anualidad (PV) - Resolver para n, 2019).

5.0 Conclusiones y recomendaciones.

5.1 Recomendaciones para APIGUACIMAL

Nuestro equipo generó una lista de pasos que la asociación debe tomar en sus futuros esfuerzos. Los pasos son los siguientes:

1. Crear y practicar una forma más formal y efectiva de finanzas y mantenimiento de registros.
2. Compre un área de terreno donde la asociación pueda crear un lugar centralizado para limpiar y embotellar su miel.
3. Obtener permisos de saneamiento del Ministerio de Agricultura y Ganadería de Costa Rica.
4. Crea una marca para su asociación.

El primer paso que debe tomar la organización es crear una forma más formal de mantenimiento de registros para poder realizar un mejor seguimiento de sus gastos, ganancias y otra información financiera. Esto permitiría a los apicultores de APIGUACIMAL tener una estructura de costos más organizada para comprender mejor en qué se está gastando su dinero, saber cuánto beneficio están obteniendo e identificar cualquier gasto innecesario.

El segundo paso que debe tomar la asociación es comprar un área de terreno donde puedan crear una planta centralizada para limpiar y poner su miel en recipientes sanitarios. Para comprar y construir esta planta, la asociación debe recibir el capital del gobierno que esperamos que suceda en base a la propuesta que hemos creado para el gobierno de Costa Rica. Con esta afluencia de capital, la asociación puede construir una planta que tenga un espacio para limpiar la miel, un cuarto para embotellar la miel y un pequeño espacio de oficina y una tienda donde

puedan vender la miel en esta ubicación central. Si bien esta es una gran inversión para la asociación, su inversión se verá compensada debido a que podrán vender su miel a un precio más alto porque ya no tendrán que venderla en estanones sino que podrán vender toda su miel en Botellas de un litro. Esto le dará a la asociación más efectivo por gramo de miel que venden. Nuestro grupo recomienda encarecidamente una ubicación centralizada con una planta para lograr los objetivos generales de la asociación.

Figura 12. Disposición de las colmenas de un apicultor local

La tercera recomendación que nuestro grupo tiene para APIGUACIMAL es obtener permisos de salud sanitaria del MAG. Este paso final es extremadamente crítico para la asociación porque sin estos permisos no podrán comercializar y vender sus productos en tiendas de abarrotes o mercados más grandes. Para recibir estos permisos, el MAG debe recibir un plan de construcción del lugar donde se limpiará y embotellará la miel. Una vez que reciban este plan, visitarán la planta y determinarán si las condiciones son sanitarias o no. Si el MAG considera

que la planta es sanitaria, entonces la asociación podrá poner estos permisos reclamando el saneamiento correcto en todas las botellas de su producto que venden. Esto permitirá que el producto sea comprado por cualquier empresa sin que la empresa tenga que preocuparse si el MAG vendrá y quitará los productos de miel de sus estantes. Para poder comercializar verdaderamente, la asociación debe primero obtener una marca, luego construir una ubicación centralizada para la producción y, finalmente, obtener los permisos sanitarios del MAG.

El último paso que APIGUACIMAL debe tomar en su esfuerzo por comercializar es crear una marca para toda la asociación. Una marca solidificada permitirá a los consumidores reconocer el tipo de miel que están comprando y de dónde proviene. Una marca que pueda asociarse con la calidad de la miel que produce la organización es un paso esencial de marketing que les ayudará a aumentar el tamaño de su mercado y les permitirá vender sus productos de una manera mucho más fácil. Finalmente, mostrará qué apicultores son miembros oficiales de la organización y la marca demostrará que la asociación se ha restablecido y está en buenas condiciones de funcionamiento. La obtención de una marca es un paso esencial en los esfuerzos de la asociación para comercializar.

Con este plan propuesto, está claro que la nueva cadena de valor de la miel de abeja es viable y, si se siguen los pasos propuestos, la asociación y el gobierno pueden garantizar que el producto sea exitoso.

5.2 Opiniones de los miembros de APIGUACIMAL

Al entrevistar a los apicultores, les preguntamos qué creen que sería más importante que el gobierno supiera para poder brindar la mejor asistencia a los apicultores. Los apicultores dijeron que lo siguiente sería más útil para que el gobierno lo entendiera:

1. Reconocer la importancia de los productores locales para la economía.

2. Comprender la importancia de las abejas para el medio ambiente.
3. Comprenda cómo dar soporte a una marca local beneficiaría a la comunidad local.

En general, la asociación es un grupo de apicultores aspirantes que buscan convertirse en una empresa local sólida. Las ideas de la asociación son infinitas, pero necesitan ayuda técnica, administrativa y financiera. El gobierno puede demostrar que están reconociendo la importancia tanto de los productores locales como de las abejas al mostrar interés en ayudar a los apicultores locales.

5.3 Propuesta de participación gubernamental

Sobre la base de los comentarios que recibimos de las entrevistas a los apicultores de la asociación, hemos recopilado los pasos recomendados que debe seguir el gobierno de Costa Rica para brindarles la ayuda adecuada que necesitan. De los apicultores que entrevistamos, la mayoría de ellos deseaba que el gobierno los ayudará de manera similar. Desean que el gobierno reconozca la importancia de los productores locales para la economía y la importancia de las abejas para el medio ambiente y también que entiendan cómo el apoyo a la asociación ayudará a desarrollar la economía local.

El gobierno puede demostrar que están reconociendo la importancia tanto de los productores locales como de las abejas al demostrar un gran interés en ayudar a los apicultores locales de su país. Esto se puede hacer a través de los medios de comunicación u otros medios de comunicación donde puedan representar la importancia de estos hombres para el país, ya que los apicultores están ayudando a polinizar los millones de cultivos y flores que Costa Rica vende cada año. Además, recomendamos que el gobierno invierta en la empresa de APIGUACIMAL para impulsar la cadena de valor para que puedan aumentar sus montos de producción y generar un retorno de la inversión positivo.

5.4 Futuro trabajo a realizar

Debido a limitaciones de tiempo, nuestro equipo no pudo obtener toda la información relacionada con la posible creación de esta cadena de valor de productos de miel. Primero, no pudimos entrevistar a todos los miembros de APIGUACIMAL y recomendamos que el CCT entreviste a los miembros con los que no hablamos para que tengan información de todos los miembros de la organización.

Como notamos el hecho de que se conservan muy pocos registros financieros y que no parecía haber un gran interés en mantener estos registros, recomendamos que el CCT continúe educando y ayudando a la asociación en sus esfuerzos por mejorar su registro financiero. Es muy importante que la asociación comience a practicar una organización financiera más eficiente para que tengan una mejor idea de cómo está funcionando el negocio.

Además, el CCT debe completar los elementos de acción que pretendíamos cumplir, pero no pudimos hacerlo debido a problemas de viaje y comunicación. El CCT debe organizar una reunión con un representante del MAG para obtener los detalles específicos sobre cómo obtener el permiso de salud. No pudimos hacer esto ya que no pudimos encontrar el contacto adecuado para configurar la reunión inicial. También sería prudente reunirse con varios apicultores de la Asociación Jicaral de Apicultura, ya que son una asociación bien establecida y entienden todo el proceso de cómo comercializar un producto producido localmente. No pudimos reunirnos con ellos debido a restricciones de viaje. Este trabajo futuro es crítico para el desarrollo de APIGUACIMAL como un nuevo negocio.

Citas y referencias

Annuity (PV)- Solve for n. (2019). Retrieved February 14, 2019, from http://financeformulas.net/Number-of-Periods-of-Annuity-from-Present-Value.html

CCT Costa Rica (2018). Project Management. Retrieved November 9, 2018, from http://www.cct.or.cr/contenido/our-programs/project-management/

El Corredor Biológico Pájaro Campana. (2018). Retrieved December 10, 2018, from http://www.cbpc.org/

Empresa de Inversiones Rosaval Ltda. Retrieved February 11, 2019, from http://roobycr.com/quienes_somos.html

Food and Agriculture Organization of the United Nations. Livestock Primary. Retrieved January 14, 2019, from http://www.fao.org/faostat/en/#data/QL

Frazier, M., Greaser, G. L., Kelsey, T. W., & Harper, J. K. (2001). Agricultural Alternatives: Beekeeping. Retrieved February 15, 2019, from https://www.premier1supplies.com/img/newsletter/05-15-14-garden/Bee_Keeping.pdf

Gordon, K. T. (2005, February 21). Marketing Tips for Launching a New Product. Retrieved February 22, 2019, from https://www.entrepreneur.com/article/76364

Hayes, A. (2019, January 29). What the Internal Rate of Return (IRR) Measures. Retrieved February 20, 2019, from https://www.investopedia.com/terms/i/irr.asp

Instituto Costarricense de Turismo. (2017). Retrieved December 8, 2018, from https://www.ict.go.cr/es/

Interest Rate | America. (2019). Retrieved February 18, 2019, from https://tradingeconomics.com/country-list/interest-rate?continent=america

Jagerson, J. (2018, November 26). What is the formula for calculating net present value (NPV)? Retrieved February 17, 2019, from https://www.investopedia.com/ask/answers/032615/what-formula-calculating-net-present-value-npv.asp

Manza Té. Retrieved February 16, 2019 from https://www.esencialcostarica.com/empresas-licenciatarias/ alimentos /manza-te/

Monteverde Costa Rica. (2019). Retrieved February 6, 2019, from http://monteverdefund.org/monteverde.html

Penner, J., Gess, P., & Beckman, N. (2017). The Three-Wattled Bellbird: Corridor, Conservation, and Costa Rica (pp. 1-5, Rep.). SESYNC. Retrieved November 18, 2018, from https://www.sesync.org/system/tdf/resources/bellbird_corridor_teaching_notes_ updated.pdf?file=1&type=node&id=2266&force=.

Product Life Cycle Strategies and Characteristics (2018). Retrieved February 22, 2019, from https://marketing-insider.eu/marketing-explained/part-iii-designing-a-customer-driven-marketing-strategy-and-mix/product-life-cycle-strategies/

Rico, (2015, March 20). Costa Rica Honey Production Dismal This Year. Retrieved February 26, 2019, from https://qcostarica.com/costa-rica-honey-production-dismal-this-year/

Singh, J. (2016, August 29). 6 Important Factors That Influence the Demand of Goods. Retrieved February 7, 2019, from http://www.economicsdiscussion.net/essays/economics/6-important-factors-that-influence-the-demand-of-goods/926

Stein, L., Farmer, C., Domenz, B., Martin, N., Anghel, F., & Cohen, G. (2018, April 25). What Is Branding And Why Is It Important For Your Business? Retrieved February 22, 2019, from https://www.brandingmag.com/2015/10/14/what-is-branding-and-why-is-it-important-for-your-business/

Three-Wattled Bellbird Biological Corridor Council. (2018). Retrieved from https://monteverde-institute.org/biological-corridor-council.html

Turner, R., & Freiermuth, E. (2017, March). Travel & Tourism: Economic Impact 2017 Costa Rica. Retrieved February 15, 2019, from https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/costarica2017.pdf

Wheeler, M. K. (2018, January 5). NYS Beekeeper Tech Team: Inventory & Financial Analysis Handbook. Retrieved February 15, 2019, from https://pollinator.cals.cornell.edu/