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# Best Practices for Collaborative Beekeeping in Northern Greece

Justine A. Roy

*Worcester Polytechnic Institute*

Karina Pereira Franca

*Worcester Polytechnic Institute*

Noah Van Stralen

*Worcester Polytechnic Institute*

Suzanne Kate Opalka

*Worcester Polytechnic Institute*

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# Best Practices for Collaborative Beekeeping in Northern Greece

By: Karina Franca, Suzanne Opalka, Justine Roy, and Noah Van Stralen



WPI



Agriculture • Environment • Life Sciences

# Best Practices for Collaborative Beekeeping in Northern Greece

An Interactive Qualifying Project Submitted to the Faculty of  
WORCESTER POLYTECHNIC INSTITUTE  
in partial fulfillment of the requirements for the  
Degree of Bachelor of Science

By:

Karina Franca

Suzanne Opalka

Justine Roy

Noah Van Stralen

Date: April 24, 2019

Submitted to:

Dr. Kostas Rotsios, Sponsor

Dr. Chrysanthe Demetry, Advisor

Dr. Richard Vaz, Advisor

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# Abstract

Greek beekeepers may have the opportunity to meet the growing demand for honey and increase their incomes through collaboration. To facilitate this, the project aimed to identify collaborative practices to help grow the bee economy in northern Greece. Through interviews with beekeepers and government officials, we identified beekeeping practices and compared them with best practices synthesized from case studies. We identified opportunities for growth and made recommendations to increase collaboration in northern Greece.

## Acknowledgements

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- Argiris Georgakas of Honey Georgaka
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## Executive Summary

Since 2007, media coverage, increased access to beekeeping resources, and a desire to try alternative lifestyles have contributed to a rise in beekeeping worldwide (Lorenz & Stark, 2015). The presence of around 20,000 beekeepers in Greece creates potential for collaboration for financial growth (Malsang, 2013). Due to the economic crisis from 2008 to 2018, many beekeepers are looking for ways to increase their income. Imported honey helps satisfy a Greek honey consumption rate that exceeds domestic production. Robust domestic and international markets for honey and other bee products present an opportunity for Greek beekeepers to expand their businesses.

With collaboration, Greek beekeepers can work to meet this demand and increase their income. Despite evidence of some positive attempts to foster beekeeping and promote a bee economy within Greece through collaboration, collaborative practices may be further developed. Honey Sithon, a successful cooperative in Greece, uses methods such as combining resources to market their products (“Honey Sithon”, n.d.). Dr. Konstantinos Rotsios, a business expert at Perrotis College, identified collaboration as an issue among Greek people (K. Rotsios, personal communication, January 31, 2019). This could be due in part to the social effects from the economic crisis (Sambanis, Schultz, & Nikolova, 2018).

Currently, no comprehensive source of best practices for collaborative beekeeping exists, which creates an opportunity to identify and adapt best practices based on agricultural case studies from around the world. These case studies demonstrate how participants’ profits have grown as a result of working together. Greek beekeepers may also benefit financially from these collaborative practices.

### **Project Goal and Objectives**

This project aimed to identify collaborative practices that can be adapted to northern Greece to help grow the bee economy. We achieved this goal through the following objectives and research methods:

**Synthesize best practices for collaborative agriculture from around the world, with an emphasis on beekeeping:** We used two methods to obtain the information for this objective: 1) finding credible sources of information, such as primary sources, articles, and academic journals; 2) interviewing agriculturalists and beekeepers.

**Assess current practices and needs of stakeholders:** We gathered information through interviews with five beekeepers, one cooperative representative, one academic, and one government official. During the interviews, we assessed the current practices, wants, and needs of local beekeepers as well as the current Greek government involvement in beekeeping and any

desire for further involvement. Due to the small number of interviews, our findings likely do not represent all practices being utilized in northern Greece or the wants and needs of all beekeepers.

**Identify best practices for possible adaptation in northern Greece:** We considered the information stakeholders provided in order to analyze which best practices local beekeepers could benefit from. We used a frequency analysis, Venn diagram, and benefits chart to aid in this process.

**Determine stakeholders' interest and willingness to adopt potential best practices:** We distributed questionnaires to gain insight from stakeholders. Based on the feedback, the suggestions were adapted to best aid the stakeholders.

### **Best Practices Synthesized from Case Studies**

From more than 30 articles, we identified nine relevant case studies that focused on collaborative agricultural practices. Below we describe four categories of best practices that have shown evidence of being effective in promoting collaboration and leading to economic benefits.

#### **Collaborative marketing to improve resource accessibility**

1. Combining resources through the cooperative model: *Agriculturalists can combine their products to reach larger markets. They may also share equipment to reduce their individual production costs.*
2. Utilizing business experts for improving marketing practices: *Utilizing business experts allows agriculturalists to focus on production, while business professionals manage the marketing and distribution of their products. This practice could help agriculturalists increase their production, while business experts help them reach more customers.*

#### **Education for increasing the competence of agriculturists**

1. Providing educational opportunities through agricultural extension services: *Agricultural extension services provide a centralized collection of educational programs to agriculturalists, which may improve accessibility. These services demonstrated success in improving production and reducing poverty through collaborative education.*
2. Agricultural mentoring programs: *Mentorship programs provide an opportunity for new agriculturalists to gain hands on experience from knowledgeable people in their field. Mentoring can also aid in networking between agriculturalists and forming a sense of community.*

#### **Government involvement in agricultural improvement**

1. Governmental policies to support beekeeping: *Government policies regarding beekeeping ensure the safety and well-being of the community, beekeepers, and bees. Policies may address hive location, hive registration, and conflict resolution.*

2. Government-provided resources and services: *The government may provide funding, educational programs, or other resources to agriculturalists in order to help them succeed.*
3. Bee friendly environmental planning: *The government can help provide a safer environment for bees by reducing pesticides and planting bee-friendly plants.*

### **Engaging the community in agriculture**

1. Encouraging community involvement and awareness of agriculture: *Encouraging citizens to embrace agriculture and participate in the solution helps raise awareness of local agriculture. Community members interested in local agriculture may be more likely to purchase goods from their local producers.*
2. Using agritourism to attract business: *Agriculturalists may attract new customers to their businesses by providing services to engage the community. Some activities may include holding tours, having tasting sessions, or attending festivals.*

### **Collaborative Practices in Northern Greece and Potential for Growth**

Figure ES.1 shows a comparison between collaborative practices in northern Greece and best practices synthesized from case studies. Nine practices observed in Greece were not present in the case studies. Encouraging community involvement and acceptance of agriculture and bee friendly environmental planning were the only best practices not observed in Greece. The remaining seven best practices had been implemented in northern Greece to some extent. Beekeepers sharing equipment was considered to be widely implemented because most beekeepers responded they already successfully participated in this practice. All other practices could be improved upon to provide more value to the stakeholders.

Based on the information and feedback we gathered, we used a benefits chart seen in Table 5.1 to make recommendations on how to improve collaborative practices in beekeeping in northern Greece. We present five suggestions to address the wants and needs of the stakeholders.



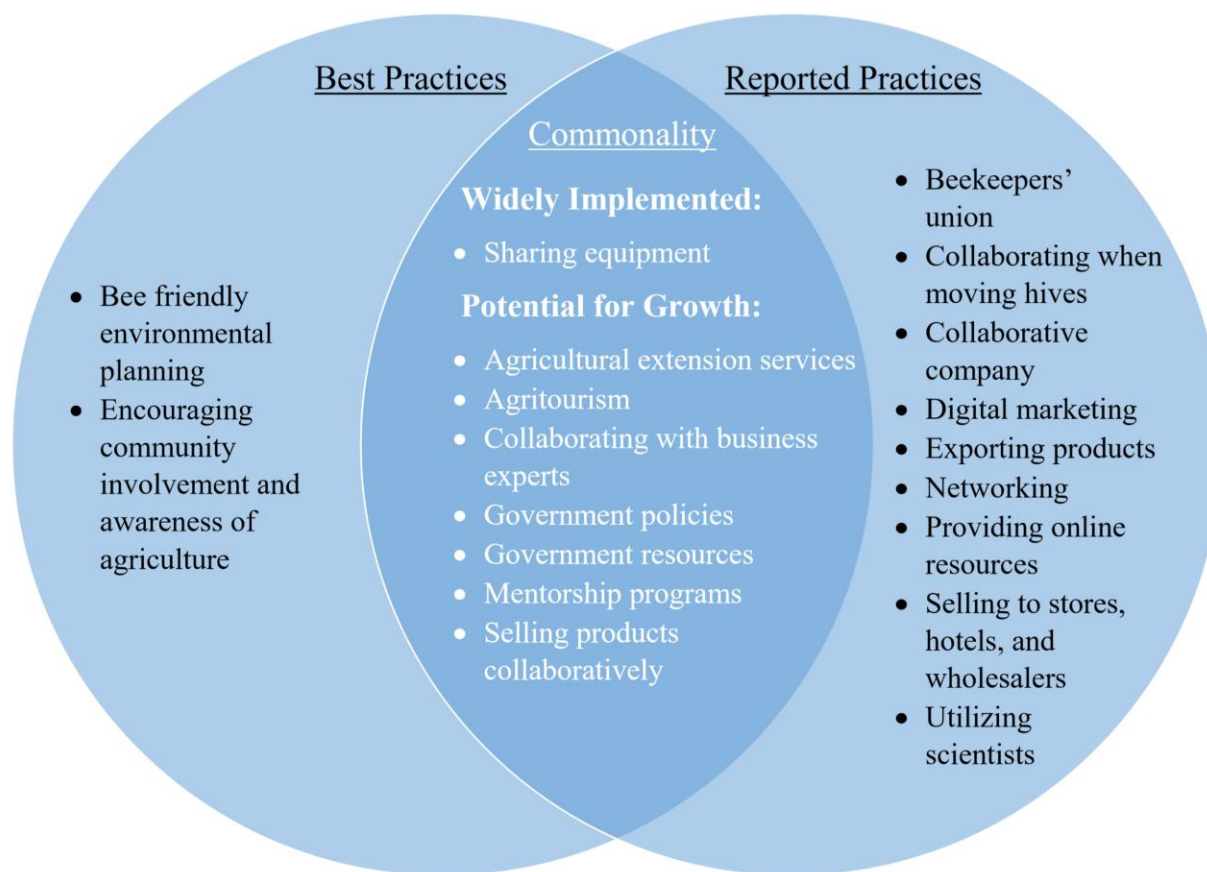


Figure ES.1: Venn diagram comparing best practices to practices reported in northern Greece

## Government resources

This category would address numerous needs: Increased government funding, mentorship, reduced business costs, reduced difficulty of selling individually, better training, better accessibility to government resources, hive land locator, business education, government help with marketing, more reliable information, increase exports, hive checks, international exposure.

Specific implementation ideas include:

- **Online portal for funding requests:** An online portal for funding requests could address the difficulty of obtaining funding. The portal could guide an applicant through the process with an easy to use interface accessible anywhere there is internet.
- **Increased resource availability:** Modifying the criteria for participation in government programs would make resources available to a broader range of beekeepers. Subsidies designed for new businesses could provide aid for only a set amount of time to enable a business to initially grow and then become self-sustaining.
- **Educational resources:** To address the lack of education of some beekeepers and unreliable information sources, the government could maintain a website listing reliable educational resources and seminars, or host their own. Classes and seminars could be

conducted in the late fall and winter seasons, when a beekeeper does not have as many hive responsibilities.

- **Online resources:** Helpful online resources may include a database of landowners who are willing to host hives for travelling beekeepers. When providing an online resource, it is important to keep the website maintained.

## Agricultural extension services

This category would address numerous needs: Mentorship, reduced business costs, reduced difficulty of selling individually, better training, better accessibility to government resources, business education, more reliable information, increased exports.

Specific implementation ideas include:

- **Business education:** An extension service can provide better resources and training on beekeeping practices, how to export and market products, and how to best utilize government resources.
- **Mentorship program:** An extension service could offer a mentorship program to help new beekeepers gain first-hand experience from a knowledgeable source of information.
- **Subsidies to fund services:** Subsidies for extension services could help new beekeepers unable to pay for services, as they may not yet have stable income.
- **Multiple locations for services:** To increase accessibility to beekeepers, extension services could have multiple locations. An extension program could offer business related classes that do not require hands on learning online.

## Government policies

This category would address numerous needs: Improved quality control, protection against colony theft, reduced pesticides, increased plants, reduced taxes, fair consumer prices.

Specific implementation ideas include:

- **Increased quality control:** Stricter penalties could increase the perceived risk of mislabeling honey and hopefully dissuade the act. Additionally, enforcing quality control through increased government testing of honey could address this need. However, this implementation requires a lot of resources and labor. A method for reporting suspected infringements could help alleviate this issue. Furthermore, the only labeling requirement currently in place is to list the countries where the honey came from. More requirements for labeling, such as identifying added sugars or other modifications, could provide more protection to producers and consumers.
- **Hive theft relief:** More severe penalties for hive theft could dissuade potential thieves. Additionally, the current insurance policy that covers hive loss due to diseases and flooding could expand to include hive theft to help protect beekeepers from the losses associated with theft.

- **Plant and pesticide policies:** Policies that encourage a greater presence of plants in areas that are lacking through incentives or imposed requirements could help increase the productivity of honeybees. Policies that prohibit pesticides can protect bees and make more land safe for hives.
- **Tax breaks:** More tax breaks for beekeepers could help reduce production costs, allowing them to price their honey more competitively against imported honey.

## Collaborating with business experts

This category would address numerous needs: Expand markets, reduced business costs, reduced difficulty of selling individually, business education, increased exports, more efficient cooperative model.

Specific implementation ideas include:

- **Mutually beneficial relationship:** Beekeepers could provide some of their products or a combination of products and money in return for a consultation with a business expert

## Selling products collaboratively

This category would address numerous needs: Expand markets, reduced business costs, reduced difficulty of selling individually, and increased exports.

Specific implementation ideas include:

- **Encourage collaboration through education:** Educating beekeepers on the benefits of combining their products to sell collaboratively may encourage them to join cooperatives or informally collaborate with other beekeepers to sell their products. Resources could be made available to educate beekeepers on the benefits and costs associated with participating in cooperatives, as well as the possibilities regarding other methods of collaborative selling.
- **Respect members' needs:** With any cooperative selling model, respecting the needs of each producer helps ensure continued membership. Expanding membership may require adjustments to the traditional cooperative model to provide better experiences to a range of members.
- **Incentivize participation:** Incentivizing beekeepers through methods such as reduced taxation or subsidies may encourage more beekeepers to join cooperatives.

Through these suggestions, the beekeeping economy in Greece may expand and grow. This project did not investigate how to best implement the suggestions. Further work will be needed to identify optimal implementations for northern Greece. Other regions across the globe may also benefit from the collaborative best practices for beekeeping synthesized through this project. Future work may include exploring how to adapt these best practices to other cultures and

economies. Similarly, further research into the practices beekeepers use in northern Greece and how they can be applied elsewhere may provide more depth and understanding of such practices.

## Authorship

The writing process was composed of two main steps. In the first step, we would divide a writing assignment into equal sections based on each person's strengths and familiarity with the topic. In the second step, we would edit the writing collaboratively. To do this we would sit together and revise each paragraph one at a time in suggestion mode on Google Docs, agreeing on all revisions before accepting the changes. This practice helped us develop a better understanding of all of the material and ensure a consistent writing voice throughout the paper. This editing process was conducted in two rounds for each submission to ensure the work was thoroughly edited.



Picture of project team

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# 1. Introduction

Since 2007, media coverage, increased access to beekeeping resources, and a desire to try alternative lifestyles have contributed to a rise in beekeeping worldwide (Lorenz & Stark, 2015). As the practice of beekeeping grew in popularity, honeybee colony collapse also rose worldwide due to harmful farming practices as well as natural factors (Williams et al., 2010). Additionally, evidence a city can provide a healthier environment for bees than a rural area helped motivate beekeepers to move from rural to urban and peri-urban areas. Malsang (2013) suggested urban environments can be safer for bees due to lower levels of pesticide exposure from farms. To protect bees and facilitate the movement towards beekeeping in urban areas, many cities adopted plans to promote beekeeping.

The presence of around 20,000 beekeepers in Greece creates potential for collaboration for financial growth (Malsang, 2013). Due to the economic crisis from 2008 to 2018, many beekeepers are looking for ways to increase their income. Imported honey helps satisfy a Greek honey consumption rate that exceeds domestic production. Robust domestic and international markets for honey and other bee products present an opportunity for Greek beekeepers to expand their businesses. With collaboration, Greek beekeepers can work to meet this demand and increase their income. Honey Sithon, a successful cooperative in Greece, uses collaborative methods, such as combining resources to market their products, and demonstrates the potential for collaboration in Greece (“Honey Sithon”, n.d.). Despite evidence of some positive attempts to foster beekeeping and further promote a bee economy within Greece through collaboration, collaborative practices may be further developed. Although Honey Sithon has seen success, Dr. Kostas Rotsios, a business expert at Perrotis College in Thessaloniki, identified collaboration as an issue among Greek people (K. Rotsios, personal communication, January 31, 2019). The social effects from the economic crisis may contribute to this unwillingness to collaborate (Sambanis, Schultz, & Nikolova, 2018).



Figure 1.1: Honey Sithon products

New practices can be implemented to foster more collaboration among Greek beekeepers. Currently, no comprehensive source of best practices for collaborative beekeeping exists, which creates an opportunity for best practices to be identified and adapted based on agricultural case studies from around the world. These case studies demonstrate how participants' profits have grown as a result of working together. Greek beekeepers may also benefit financially from these collaborative practices.

This project aimed to identify collaborative practices that could be adapted to northern Greece to help grow the bee economy. The following objectives guided the data collection and analysis portions of the project:

1. Synthesize best practices for collaborative agriculture from around the world, with an emphasis on beekeeping
2. Assess current practices and needs of stakeholders
3. Identify best practices for possible adaptation in northern Greece
4. Determine stakeholders' interest and willingness to adopt potential best practices

To meet these objectives, we held interviews with stakeholders, including local beekeepers and government officials, to learn about the current beekeeping practices. We discussed their wants and needs for promoting collaboration in order to benefit the bee economy. We then compared existing practices with the best practices identified in agricultural case studies. In order to gain feedback on the best practices we suggested for northern Greece, we distributed questionnaires to stakeholders. After this, we determined final suggestions based on the stakeholders' responses on how to generate financial growth through collaboration among beekeepers.

## 2. Background

In this chapter, we begin by introducing the causes and implications of honeybee colony collapse and how the increased trend in urban beekeeping worldwide addresses this problem. We then identify the current state of beekeeping in Greece and the practices that have been successful. Next, we discuss the financial and social effects of the Greek economic crisis on the Greek citizens. Lastly, we explain the financial benefits of collaboration and how Greek beekeepers may also benefit from collaboration.

### 2.1 The Trend Towards Urban Beekeeping

Honeybee colonies are dying rapidly worldwide due to a combination of harmful farming practices, such as pesticide use, and natural factors, such as climate change and pests. The disappearance of adult bees from a colony without signs of mites or parasites, known as Colony Collapse Disorder, contributes to the large loss of bee colonies (Williams et al., 2010). Colony loss in locations such as Canada, China, and Europe exceed a healthy rate by more than double (Van der Zee et al., 2012). During a Greek winter, beekeepers typically experience losses no greater than 10% but, in recent years, the country has been exceeding this mark. For example, colony loss exceeded 30% over the winter of 2004 (Hatjina et al., 2010). This high rate of colony loss generates concern because honeybees are easy to maintain and transport to crops that need pollination, making them important pollinators. As a result of colony loss, Boston University estimates a yearly loss of \$5.7 billion worldwide. (BU Science Journalism Program, 2018).

The effects of pesticide exposure and increased bee colony loss prompted the relocation of many hives from rural to urban areas. Exposure to sublethal levels of pesticides, such as neonicotinoids, suppresses a honeybee's immune system and its ability to learn, leading to difficulty foraging (Desneux, Decourtye, & Delpuech, 2007). Malsang (2013) suggested the urban environment can be safer for bees due to smaller amounts of pesticide exposure from farms. Furthermore, urban areas often offer greater plant diversity, resulting in an increased production rate from bees.

Many cities around the world adopted urban beekeeping in recent decades. One of the cities at the forefront of urban beekeeping, Ljubljana in Slovenia, received the "European Green Capital" award in 2016 (Dakskobler, 2018) as well as the "Most Bee-Friendly Municipality" in 2017 ("The Bee Path", n.d.). After adopting beekeeping in the city, Boston reported an increase in honey production of about 30% due to the better environment provided by the city (BU Science Journalism Program, 2018). Chapter 4 will further examine case studies from Ljubljana, Boston, and other cities that adopted urban beekeeping.

## 2.2 The Current State of Beekeeping in Greece

In Greece, beekeeping influences the economy and culture. An average honey consumption rate of 1.7 kilograms per person per year demonstrates the cultural significance of honey in the Greek diet. To meet this demand, about 20,000 Greek citizens took part in apiculture in 2013, with 1,500 of them identifying it as their main source of income (Malsang, 2013). In 2015, Greece was considered the fourth most important honey producer in Europe (Farr, 2015). Figure 2.1 shows an increase in both honey imports and exports in Greece between 2005 and 2017. Similarly, Figure 2.2 shows the honey import rate in the European Union has been greater than its honey production rate over the same period. Additionally, rising production and import rates in the European Union suggest a growing demand. This information indicates market demand and economic opportunity for Greek beekeepers both locally and internationally.

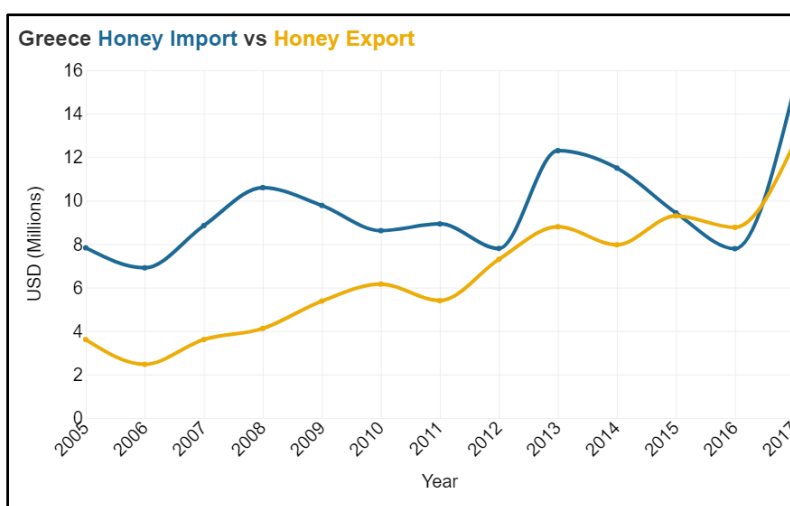


Figure 2.1: Greek honey imports and exports from 2005 to 2017, according to data from the Observatory of Economic Complexity (2017).

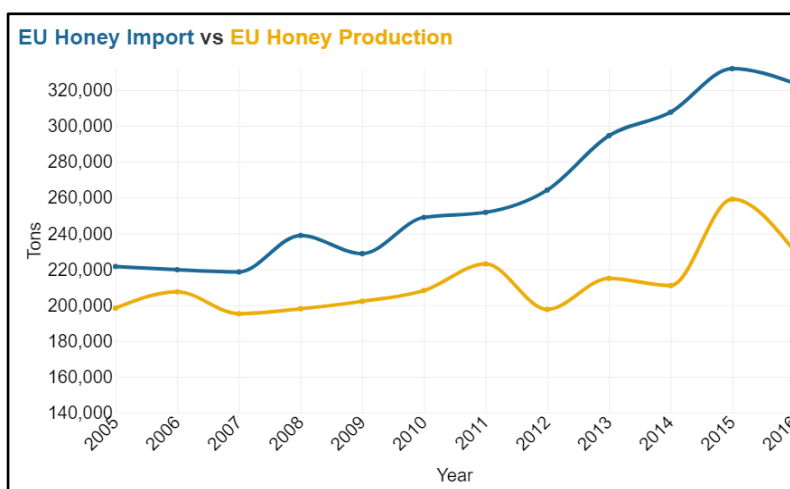


Figure 2.2: European Union honey imports and exports from 2005 to 2016, according to data from Food and Agriculture Organization of the United Nations (2016).

Athens and Thessaloniki host annual honey festivals to attract the interest of the community by serving a variety of honey products and teaching visitors about the benefits of bee products (N. Avgena, personal communication, March 14, 2019). Furthermore, a beekeeping documentary, “Brave New World”, aired in Thessaloniki in 2017 as part of the Public Administration Reform program. This film follows the lives of two beekeepers practicing chemical-free beekeeping. It highlights lessons that can be learned from the organization of a beehive to help solve human conflicts (“The Time of the Bees”, n.d.).

Within the private sector, Anel, a beekeeping supply company, established a honey farm just outside of Thessaloniki as a corporate social responsibility project. At this farm, visitors may observe honeybees at work, participate in bee related activities, de-stress through apitherapy, and purchase bee products. This site promotes sustainable practices, wellness, and biodiversity (“Anel Honey Park”, n.d.). In addition, a honey cooperative, Honey Sithon in Chalkidiki, unites beekeepers to sell their products under one name. Despite efforts towards promoting beekeepers and their products, Greece falls short of the achievements of other regions.

## 2.3 Relevance of the Economic Crisis in Greece

The prominent economic state of Greece affects the beekeeping industry. The economic crisis in Greece lasted from 2008 to 2018 and greatly impacted the citizens. Figure 2.3 shows the unemployment rate in Greece compared to the unemployment rate in the eurozone from 2005 to 2017.

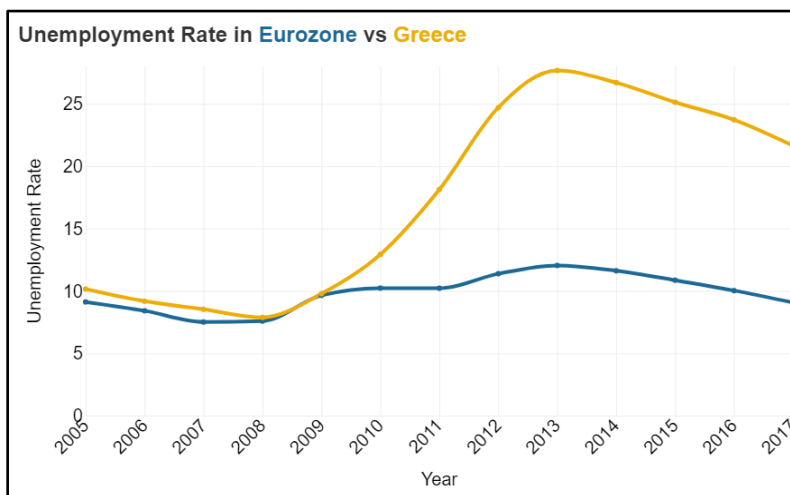


Figure 2.3: Unemployment rate in Greece and the eurozone from 2005-2017, according to data from the Federal Reserve Bank of St. Louis (2019).

After the beginning of the economic crisis around 2009, the unemployment rate in Greece greatly increased, while the eurozone unemployment rate remained low, fluctuating between 8% to 12%. The unemployment rate in Greece peaked at an all-time high of 28% in 2013. The youth population seemed to suffer even more with the youth unemployment rate standing at above 40%

(Nelson, 2018). Businesses suffered due to the difficulty of securing new loans resulting in part-time and low paying jobs and a high risk of poverty (Amadeo, 2019; Nelson, 2018). Due to the crisis, Greek people began exploring different forms of income through agricultural activities such as beekeeping.

The economic crisis effected Greek citizens' attitudes and beliefs. Sambanis et al. (2018) observed that, after the crisis, the feeling of solidarity decreased among Greek citizens. Even more so, the crisis intensified in-group bias, or the favoring of one's own group over others, as trust between Greek citizens and non-Greeks deteriorated (Sambanis et al., 2018; Cherry, 2018). As a collectivist culture, Greece is considered to focus on the needs of the group over individuals' needs ("Greece", n.d.). As mentioned earlier, Dr. Rotsios claims that collaboration is a challenge between Greek citizens (personal communication, February 11, 2019). This decrease in solidarity affects the potential for collaboration in beekeeping, which in turn could also decrease the economic opportunity for Greek citizens.

## 2.4 Collaborative Practices to Aid in Economic Growth

Case studies from around the world provide evidence that encouraging beekeepers to work with others often helps increase their income and contributes to the economic growth of a city or region. Through collaboration, an agriculturalist may develop their skills and resources to improve their business, and in turn, contribute to a more robust local economy.

Agriculturalists participating in collaboration benefited from increased sales, increased business skills, and reduced losses. The Intervale Food Hub, a community supported agriculture (CSA) program in Vermont consisting of a group of farmers working with staff, benefited from collaboration. Participating farmers reported an increase in income and greater exposure to new customers (Schmidt, Kolodinsky, Desisto, & Conte, 2011). Similarly, beekeepers participating in Ljubljana's Bee Path project experienced increased success. The Bee Path, a coalition of 35 member organizations, promotes beekeeping and bee education in the city ("Ljubljana's bee path", n.d.). The project co-financed beekeepers which helped establish five new beekeeping businesses and led to an increase in the professional competency of the beekeepers ("Bee path", n.d.). Furthermore, legislation banning harmful pesticides contributed to a decrease in major hive losses and reports of colony collapse in recent years (Dakskobler, 2018). This decrease in losses further contributes to the success of beekeepers through higher yields and reduced costs.

As agriculturalists grow more successful, the local economy improves. The city of Ljubljana saw economic growth because of the success of their beekeepers. The city also experienced increased self-sufficiency as a self-sustaining economy developed through the Bee Path program ("Bee path", n.d.). Similarly, the Flower Fields of Carlsbad in San Diego County experienced an increase in revenue. A survey of visitors reported the Flower Fields were their main reason for traveling to the area. The same study indicated that these tourists contributed \$3,778,653 to the economy of Carlsbad (Lobo et. al., 1999). The tourism generated by agriculture provides a large source of revenue for the city.

The trend towards increased beekeeping, particularly in urban areas, creates opportunities for Greek citizens to supplement their income. A high demand for honey and other bee products creates a favorable market. Case studies from around the world provide evidence that collaboration may help beekeepers meet this demand and benefit financially. Implementing practices from these case studies in Greece may help improve the bee economy.

### 3. Methodology

The project aimed to identify which best practices for collaborative beekeeping can be adapted to northern Greece to strengthen its bee economy. To achieve this goal, we developed the following research objectives:

1. Synthesize best practices for collaborative agriculture from around the world, with an emphasis on beekeeping
2. Assess current practices and needs of stakeholders
3. Identify best practices for possible adaptation in northern Greece
4. Determine stakeholders' interest and willingness to adopt potential best practices

An outline of the methodology can be seen in Figure 3.1, with each box representing one of the objectives. In this chapter, we describe the methods used for obtaining and analyzing information from different sources to develop recommendations for collaborative beekeeping in Greece.

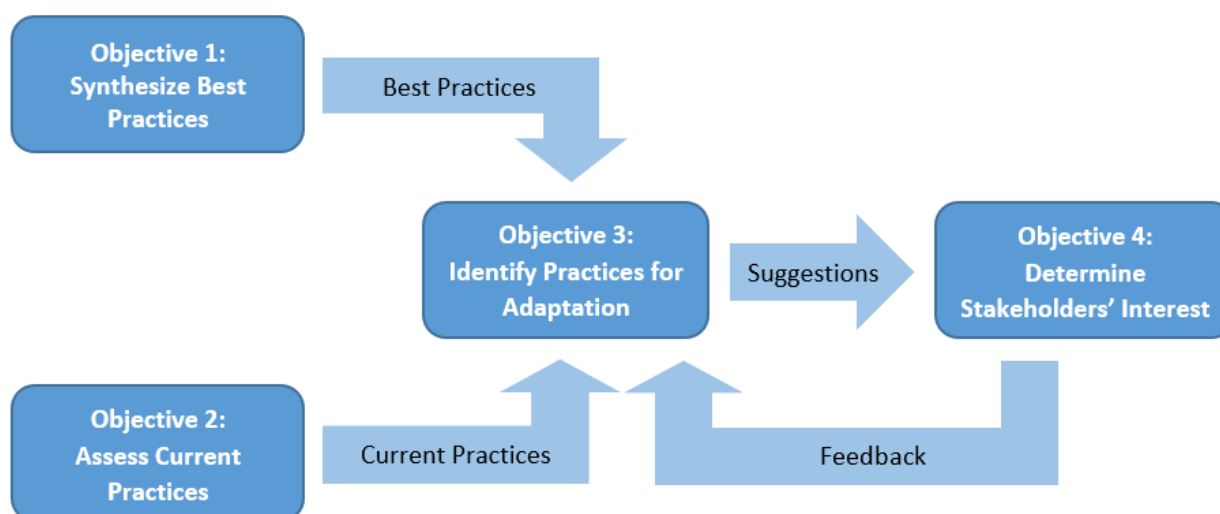


Figure 3.1: Methodology flow chart

#### 3.1 Synthesize Best Practices for Collaborative Agriculture from Around the World, with an Emphasis on Beekeeping

When trying to improve, many businesses identify successful methods used by others and adapt them to fit their needs. Morrison (2011) defines best practices as methods that lead to the most effective outcomes for a given situation. Apiculturists, more commonly known as beekeepers, may also learn from best practices. These practices can improve beekeeping businesses and the success of beekeepers. The following questions guided the research on best practices:

1. Where have collaborative best practices in agriculture been implemented?
2. What have other places done to promote collaborative agriculture practices?



### 3. What economic benefits resulted from these practices?

We used two methods to obtain this information: 1) finding credible sources of information, such as primary sources, articles, and academic journals; 2) interviewing agriculturalists and beekeepers.

We found case studies by searching databases, such as Google Scholar and JSTOR. After finding a collaborative case study, we conducted more detailed research on the location of the case study to determine the details of the collaborative practices. We also explored the references in the bibliographies of the case studies to find additional resources. In total, we used 37 articles and identified nine case studies relevant to the project.

Interviews provided insight into collaborative best practices used in other locations and the resulting financial benefits. We contacted individuals in the beekeeping field for these interviews, such as representatives from Honey Sithon in Greece and Hebert Honey in the United States. We then analyzed the information gained from these two methods to identify themes and categorize best practices for collaboration in agriculture. Within each category, we synthesized best practices that directed the research going forward.

## 3.2 Assess Current Practices and Needs of Stakeholders

We focused on beekeepers and government officials in northern Greece as the key stakeholder groups for this study. We interviewed members of these groups to gather information on current beekeeping practices and challenges, as well as the wants and needs of the beekeepers. The interviews were arranged through Dr. Rotsios, Dean of Undergraduate Studies at Perrotis College, and lasted about one hour each. The following research questions guided the interviews with local beekeepers to assess their current practices, wants, and needs:

1. What are the current practices used by beekeepers to promote their businesses and community involvement?
2. What resources do beekeepers currently utilize from organizations and the government?
3. What are the wants and needs of local beekeepers in order to help them economically?

We sought information about the current Greek government involvement in beekeeping, as well as any desire for further involvement. The research questions below helped direct the interviews with government officials:

1. What are current government policies or initiatives related to beekeeping?
2. What is the government's interest level in implementing new policies or practices that benefit local beekeepers?

Although we prepared questions and customized them to each interviewee, we conducted interviews in a conversational manner. The introduction, consent, and conclusion statements, as

well as a set of standard questions for each stakeholder group are attached in Appendix A. During interviews, two project members took notes, while the other two asked questions. After the interview, we typed the notes, which can be found in Appendix C. We conducted interviews on the American Farm School campus, during site visits, and through conference calls. Translators were used to facilitate some interviews, but the language barrier may have limited the clarity of the information collected due to the possibility of information being lost or miscommunicated in the process.

For each beekeeper interview, we began with personalized questions to learn about the beekeeper's background in the activity and their current practices. We sought information on past collaborations with other beekeepers or community members, as well as their willingness to collaborate in the future. We also sought to understand the significance of issues from the perspectives of multiple local beekeepers of varying scales of operation ranging from hobbyists to professionals. We asked questions about what educational practices they participated in, such as agricultural extensions or mentoring programs. To identify further areas of want or need, we asked about what government support the beekeeper used, as well as what support they would want provided. We also determined the economic role beekeeping plays for the interviewee. In total, we conducted four interviews with beekeepers and one interview with a representative from a beekeeping cooperative. Due to the small number of interviews, the findings almost certainly do not reflect the full range of beekeepers in northern Greece.



Figure 3.2: Interview with Argiris Georgakas from Honey Georgaka

We determined current government collaboration with beekeepers and interest in further collaboration through interviews with a local government official and a government consultant. We gauged the government's interest in beekeeping in order to make appropriate and feasible suggestions for best practices. These interviews likely did not provide complete insight into the government's perspective since only a regional government official was interviewed.

### 3.3 Identify Best Practices for Possible Adaptation in Northern Greece

Next, we considered the information stakeholders provided in order to analyze which best practices local beekeepers could benefit from. The research questions below guided the analysis:

1. Which wants and needs are common to multiple stakeholders?

2. Where are there overlaps between global best practices and areas for improvement in northern Greece?
3. What challenges do possible suggestions face in northern Greece?
4. What potential best practices may provide the most value to stakeholders?

With the results gathered from these questions, we identified practices that would provide greater value for northern Greece.

To identify the common wants and needs, we analyzed the responses from the interviews. We focused on statements about current practices, improvements desired by both stakeholder groups, and challenges beekeepers faced. We created a matrix that grouped information from each interview into each of those three categories in order to facilitate further analysis.

A frequency analysis was then used to determine how often a particular concern or area for improvement was mentioned. Ideas were analyzed for frequency, rather than specific words because different phrasings may be used to express the same idea. Due to a small number of interviews and variation between the questions asked, this frequency analysis could not be used for statistical analysis. However, qualitative insight was drawn from the relative frequency of different ideas. Repetition of a concern or want indicated more people could benefit from that issue being addressed through suggested best practices.

To compare the current practices in northern Greece to the synthesized best practices, we used a Venn diagram following the format seen in Figure 3.3. One circle represented the best practices synthesized from case studies around the world, and the other circle encompassed the practices seen in northern Greece based upon information gathered during interviews. We were interested in two areas of the Venn diagram. The area including only the best practices identified from case studies, labeled A, indicated practices that could be implemented but had not been implemented yet. These practices could provide new methods, perspectives, and benefits to the stakeholders. The common area between the circles, labeled B, also presented interesting information. Two classifications of practices fell in this area. Widely implemented items in this area were no longer considered as they were already providing benefits. In contrast, the best practices that had not been implemented to their full potential could be improved upon for further growth.

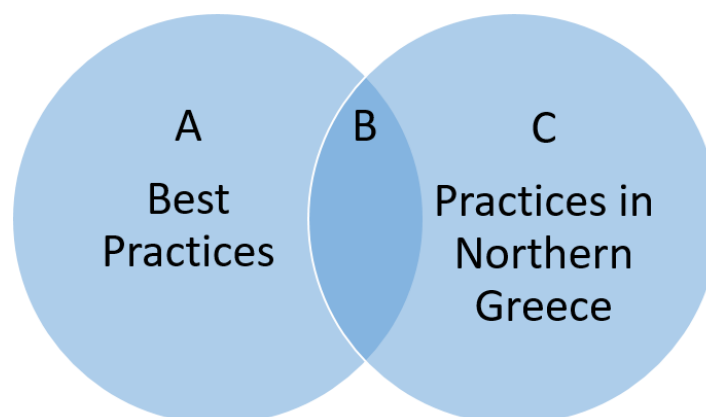


Figure 3.3: Comparing best practices and current practices in Greece

To determine which practices could provide the most value to the stakeholders, we created a benefits table. We mapped the wants and needs identified by stakeholders against best practices from around the world. This provided a visual representation of which practices could provide the most value. We gave higher priority to practices that addressed multiple issues and wants and needs of greater concern.

### 3.4 Determine Stakeholders' Interest and Willingness to Adopt Potential Best Practices

After determining potential suggestions to improve collaboration and the beekeeping economy, we gathered feedback from stakeholders. The following research questions motivated this objective and guided feedback gathering:

1. Are the proposed best practices valued by the stakeholders?
2. Do the stakeholders express reservations to any element of the implementation?
3. Are there any foreseeable complications that may arise?

In an effort to make the suggestions beneficial to northern Greece, we distributed questionnaires to gain insight from the stakeholders. The questionnaires were created in Qualtrics, an online surveying platform, and emailed to stakeholders. In the questionnaire, descriptions of the suggested best practices were provided to the respondents. For each suggestion, we asked respondents to rate how much they believed the suggestion would benefit beekeepers on a scale of one to ten, the reason for their rating, and any concerns they had. We received two completed questionnaires, which aided us in revising the suggestions, despite the feedback not reflecting the full range of stakeholders.

## 4. Collaborative Best Practices Synthesized from Agricultural Case Studies

In this chapter, we explore agricultural best practices from around the world with an emphasis on collaboration and beekeeping. We identify collaborative best practices in agriculture and synthesize four categories of these best practices from case studies.

### 4.1 Collaborative Marketing to Improve Resource Accessibility

Williams (2013) from Forbes Magazine argued collaborative marketing is gaining popularity. This strategy involves combining resources, such as money and time, in order to improve connections, popularity, and brand influence. The parties involved have a common goal or interest and use their available resources to achieve that goal. Combining resources enables them to do more than they could as individuals (Williams, 2013). In the next two sections, we explore two ways in which collaborative marketing may occur.

#### 4.1.1 Combining Resources through the Cooperative Model

Combining resources empowers agricultural groups to grow their business and expand their customer base. Beekeepers can share resources, such as equipment and market base, to increase everyone's success. A cooperative combines participants' resources by selling and marketing products under one name. Honey Sithon, one of the few successful Greek cooperatives, suggested this method works (K. Rotsios, personal communication, January 31, 2019). The cooperative aims to expand honey sales in Greece and across the world. Honey Sithon runs three retail stores in Thessaloniki and exports its products to other countries, such as the United States, Germany, and Japan ("Honey Sithon", n.d.). Stella Gerochymou (personal communication, February 7, 2019), from Honey Sithon, argued its best marketing tool is the quality of its products and brand name. However, it also advertises in magazines, at fairs, and on social media. Employees hand out samples to draw in new customers, such as tourists, to their business (S. Gerochymou, personal communication, February 7, 2019).



Figure 4.1: Honey Sithon's production facility in Chalkidiki

Beekeepers willing to unite and cooperate sustain the cooperative. Honey Sithon opened a packaging plant and quality laboratory in order to maintain quality standards. Its honey won numerous awards for quality and taste. All of this allows the cooperative to market its business across Greece. Honey Sithon provides evidence that when beekeepers come together, they can reach a larger customer network. It would be difficult for one beekeeper to produce enough honey to export their products or open up multiple retail stores. By joining a cooperative, beekeepers have more resources to market and sell their products in order to grow their business.

#### 4.1.2 Collaborating with Business Experts for Improving Marketing Practices

Collaborating with business experts can allow agriculturalists to focus their efforts on farming. The Intervale Center, a nonprofit organization in Vermont, formed a collaboration called the Intervale Food Hub. Local farmers work together with employees of the nonprofit to increase their income, as well as provide convenient access to locally grown foods. The Intervale Center staff coordinates most of the business and marketing responsibilities, relieving the burden from farmers. Staff members help farmers establish good business practices. They coordinate pick up locations with local businesses to reach a larger audience and create awareness of the agricultural movement through CSA marketing. This relieves most of the management responsibilities many farmers do not want to handle. Farmers stated that, while participating in the Intervale Food Hub, they noticed an increase in income and greater exposure to new customers (Schmidt et al., 2011). This suggests that when farmers focus on farming and allow others to take on responsibilities, such as marketing, they may experience financial growth.

## 4.2 Education for Increasing the Competence of Agriculturists

Educational programs benefit farmers and beekeepers by teaching them skills to improve their productivity. As new research and technologies are developed and released, it becomes increasingly important to provide education to agriculturalists (“Agricultural Extension”, n.d.). Successful initiatives to educate beekeepers on better beekeeping and business strategies promote collaboration between agriculturalists and educators.

### 4.2.1 Providing Educational Opportunities through Agricultural Extension Services

Agricultural extensions play an important role in providing education to agriculturalists through the use of scientific research and knowledge on agricultural practices (“Agriculture Extension”, n.d.). The agricultural extension, Ecological Beekeeping Project, aims to improve ecological beekeeping and the marketing of products in Turkey. The extension teaches beekeepers how to better market their products and trains them in ecological beekeeping. Beekeepers interested in the extension meet twice a month for a year and are awarded certificates at the completion of their trainings (Saner, Yercan, Engineniz, Karaturhan, & Cukur, 2008). Saner et al. (2008) found the trainings led to an improvement in the production and marketing of honey in Turkey.

Agricultural extension services may effectively reduce poverty through collaboration. An agricultural extension program in Kenya, Farming Systems Kenya, forms groups composed of

about 15 farmers to promote collaboration in the local area. Members are provided training classes at affordable prices, outweighing the initial fee to join. Membership also grants easier access to information on marketing and other best practices. Participating in the group facilitates networking, combining resources, and receiving advice. Extension services, such as Farming Systems Kenya, provide opportunities for farmers to expand their knowledge and optimize their resources. Farmers use the knowledge they gain to improve their farming practices. These better production techniques may lead to an increase in crop yield. The greater yield can increase profit, which may help decrease the poverty rate in farmers (Muyanga & Jayne, 2008).

#### 4.2.2 Agricultural Mentoring Programs

New agriculturists may thrive through mentorship programs with experienced agriculturalists who provide helpful resources and information. To address the lack of experience of new beekeepers in Berlin, a beekeeping association in the city pairs new members with experienced members to help them begin beekeeping (Lorenz & Stark, 2015). Mentorship by experienced beekeepers bridges the knowledge gap through individualized, hands-on learning experiences for new participants.

Mentorship programs benefit agriculturalists in other fields as well. The Intervale Food Hub in Vermont facilitates networking among farmers to encourage collaboration and improve farming practices. Beginner farmers take advantage of this resource to learn from more experienced and successful farmers. The farmers that participated in the collaboration noticed an increase in income (Schmidt et al., 2011). Utilizing experienced agriculturalists to help educate new ones can result in improved practices for both parties involved. As a result, this practice may help increase the opportunities for economic growth for agriculturalists.

### 4.3 Government Involvement in Agricultural Improvement

Government support often plays a role in the success of bee programs. It serves as a form of collaboration between the beekeepers, the government, and oftentimes the general public. Below we describe three main forms of government support and intervention that emerged from the case studies. Each form builds towards a comprehensive support network for beekeeping.

#### 4.3.1 Governmental Policies to Support Beekeeping

Policy making establishes the procedures to accommodate and respond to a growing bee program. This support can influence how successful a bee economy will be. For example, the state of Maine produced an easily accessible document written by the Maine State Beekeepers Association, Inc. It details the best practices for beekeeping management, and it is the state's source for handling bee related issues.

Maine promotes and enforces eleven practices to help ensure healthy hives and public safety. For example, a policy mandating hive registration provides information the state then uses to publish a list of beekeepers offering swarm removal services. This resource connects citizens with bee

infestations to beekeepers who can remove and care for the bees. Other policies involve hive care and placement in order to respect neighbors (“Best Management Practices for Beekeeping”, 2018). All of the policies work towards keeping citizens safe and mitigating conflict as a result of beekeeping.

#### 4.3.2 Government-Provided Resources and Services

In some cases, the government may supply resources and funds to help beekeepers in their practices. By providing resources to beekeepers, the beekeepers may then generate value for the city and economy in the form of bee products. For example, the city of Boston provides resources to beekeepers to help ensure their success. The city helped start the urban beekeeping trend in Boston when it legalized beekeeping in 2014 (BU Science Journalism Program, 2018). Since then, the city provides resources, such as hive maintenance, to the community. The Massachusetts Department of Agricultural Resources’ (MDAR) Apiary Program provides several services to help beekeepers maintain healthy colonies. In addition to researching incidents of colony death, the department offers inspections to ensure local beekeepers’ hives are free of pests and pathogens (MDAR Apiary Program, n.d.). Partially due to these government initiatives, the MDAR Apiary Program reports an estimated 40,000 to 45,000 hives belong to 4,000 to 4,500 beekeepers in Boston. Such programs lowered the skills barrier facing new beekeepers. Free hive maintenance and inspections help ensure a hive stays healthy, even when beekeepers might not know what to look for themselves. This in turn benefits the entire community by preventing the spread of bee diseases and pests.

In order to help support new beekeepers, the city of Ljubljana co-financed beekeeping operations, which led to five new beekeeping businesses within the city (“Bee path”, n.d.). The city invested resources and funds into the beekeeping community as part of their comprehensive Bee Path program. In order to handle the rise in the bee population because of their program, a rapid bee response unit formed to handle bee swarms. These swarms form when the queen decides to find a new hive. After reaching a critical level of up to five swarms in the city per day, seven responders came together to form a swarm response unit (Dakskobler, 2018). Providing resources to establish this rapid response team helped improve the safety of the city. Overall, since 2015, the government has provided 14,000 euros to the project, leading to multiple benefits for the city and government itself (“Ljubljana’s bee path”, n.d.). The rise in pollinators helped increase the self-sufficiency of the city. Co-financing beekeepers improved their professional competence. Overall, the combined effects of supporting sustainable practices and using ecologically friendly resources helped promote a self-sustaining economy (“Bee path”, n.d.). The city benefited in a range of manners, gaining the initial investment back in value added to the city. Therefore, this case study suggests that a city is more likely to strengthen its economy and the competency of its beekeepers, as well as maintain safety, when it provides resources and funds to a bee project.



### 4.3.3 Bee Friendly Environmental Planning

Governments may also intervene by establishing a healthy and safe environment for the bees. Through the Bee Path, Ljubljana’s government took action to make the city bee friendly. Ljubljana was the first European city to prohibit neonicotinoids, a pesticide that contributes to the increase in hive loss worldwide. The city also banned the use of the glyphosate herbicide in public areas. It may be for these reasons that the country has reported no major hive losses or reports of colony collapse in recent years (Dakskobler, 2018). This shows how government actions may benefit beekeepers and protect bees.

The city also grows bee friendly plants to give bees plenty of opportunities to flourish. It focuses on having perennials and forested areas within the city while trying to promote the diversity of native plants (“Bee path”, n.d.). In particular, the only trees the city plants are nectar bearing, which aids the bees in honey production (Dakskobler, 2018). All of these elements contribute to a bee friendly city. Small changes to the environment of the city may affect the overall success of a bee program.

## 4.4 Engaging the Community in Agriculture

Involving the general public can promote the development of collaborative bee economies. For beekeepers to profit from their efforts, there must be people willing to purchase their products and services. Engaging with the community helps establish a connection between the beekeepers and their customers, which can increase sales.



Figure 4.2: Community bee education at Anel Honey Park

### 4.4.1 Encouraging Community Involvement and Awareness of Agriculture

Citizen involvement in agriculture can benefit the economy. Project “Help the bee” in Ljubljana encourages citizens to grow bee friendly plants (“The Bee Path”, n.d.). The Bee Path hands out seeds to citizens in order to promote community involvement (Dakskobler, 2018). These initiatives may also encourage citizens to get involved in apiculture themselves (“The Bee Path”, n.d.).

Promoting awareness of bees is another opportunity for community engagement. Berlin’s initiative “Berlin summt!”, or “Berlin is buzzing!”, promotes a positive coexistence with bees. This initiative placed beehives on top of prominent buildings in the city to help achieve this goal (Lorenz & Stark, 2015). Similarly, Ljubljana worked to promote community acceptance of bees

by offering a museum of apiculture and a public honey garden (“The Bee Path”, n.d.). Additionally, some beekeepers in Ljubljana open their farms to provide educational experiences to the public (Leadbeater, 2017). These initiatives strive to replace the image of harmful bees with an image of helpful bees. They also increase the visibility of beekeeping within the city and citizens’ willingness to get involved.

#### 4.4.2 Using Agritourism to Attract Business

Agritourism, a commercial enterprise that allows the public to experience agriculture, provides another opportunity to engage with the community and increase beekeepers’ profits. Examples include vineyard tours and “u-pick” apple orchards (University of California Agriculture and Natural Resources, n.d.). A United States study found that a farm engaging in agritourism can gross \$16,000 to \$19,000 more than a farm not engaging in agritourism (Khanal & Mishra, 2014). Agritourism is comprised of two important practices. First, collaboration between beekeepers and tourists can provide tourists with unique experiences. In Ljubljana, the Bee Path

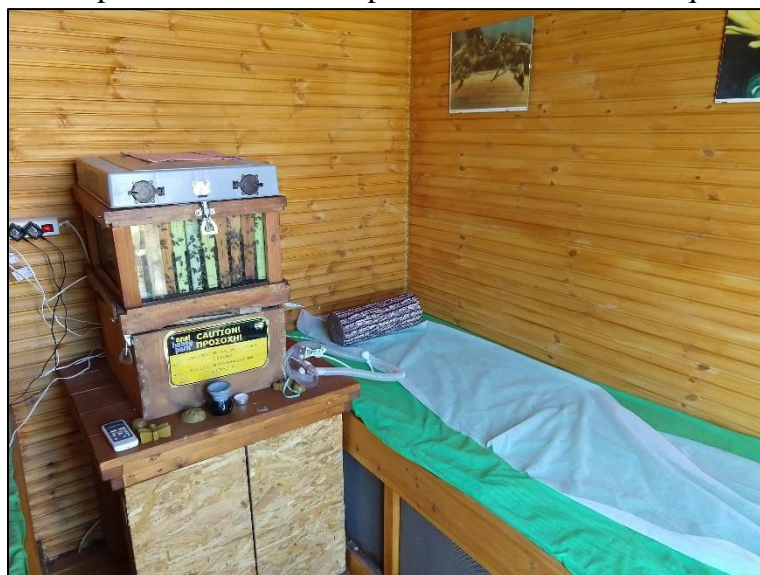


Figure 4.3: Apitherapy at Anel Honey Park

coined the term apitourism, or bee specific agritourism. The program offers tourists a variety of activities and experiences in which they may participate. For example, a hotel serves raw honey from beehives kept on its roof. Apitherapy, a practice using bees to promote relaxation, offers visitors the opportunity to lie down, smell the sweet air from the hive, and watch the bees at work (Leadbeater, 2017). Experiences such as these could help attract more tourists to the city.

Multiple agriculturalists collaborating to make events possible can also increase beekeepers’ ability to engage with tourists. Annual events around the world display beekeeping products. For example, on Honey Day in Ljubljana, beekeepers introduce themselves to the community and provide samples of their products, such as pollen and honey champagne, to the public to attract new customers. More regularly, Ljubljana holds markets to sell bee products, such as local farmers’ markets (“The Bee Path”, n.d.). Such events benefit the local bee economy by marketing the industry to potential customers. These events encourage beekeepers to cooperate in order to grow their industry.

## 5. Opportunities to Strengthen Collaborative Beekeeping Practices in Northern Greece

In this chapter, we use an analysis of current beekeeping practices and areas for growth to make suggestions on how to improve the bee economy through collaboration. We identify areas for growth by comparing the current practices in northern Greece to the best practices from the case studies. We categorize the practices into four areas: 1) existing practices not observed in the case studies; 2) best practices that have not been implemented; 3) widely implemented best practices; 4) implemented best practices with potential for improvement. Next, we suggest best practices for possible implementation in northern Greece based on an analysis of the wants and needs of the stakeholders. Finally, we discuss the stakeholders' responses to the suggested best practices and possible adaptations for the suggestions.

The findings presented in this chapter emerged from an analysis of interviews with five beekeepers, one cooperative representative, one academic, and one government official. The small number of interviews presents a limitation, as the findings likely do not represent all practices being utilized in northern Greece or the wants and needs of all beekeepers. However, these interviews thoroughly explored each individual's perspectives and provided details about what practices they felt are widely implemented and which have the potential for growth.

### 5.1 Areas for Growth in Collaborative Best Practices

In this section, we compare the practices already utilized in northern Greece to the best practices synthesized from the case studies through the Venn diagram shown in Figure 5.1. The left area contains best practices from the case studies and the right area contains the current practices in Greece. The overlap represents the best practices that are currently widely implemented or have the potential for growth.

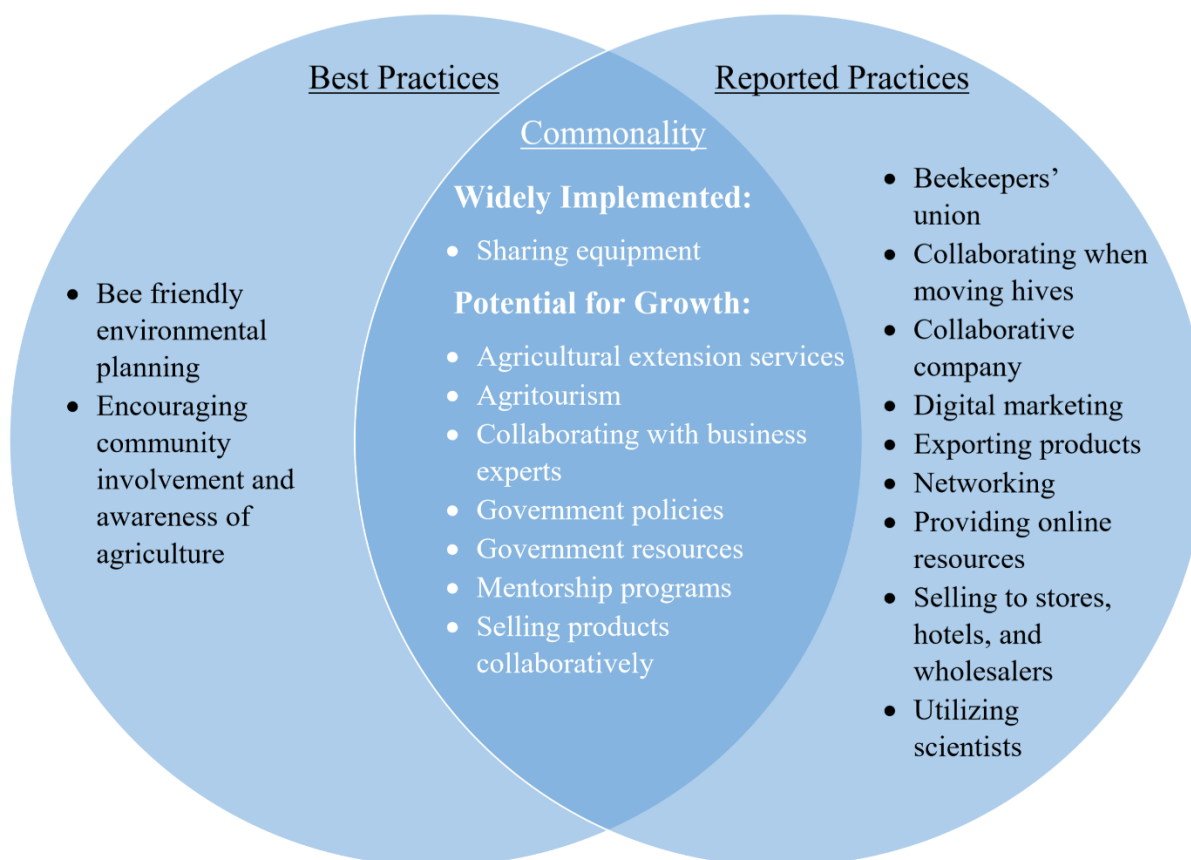


Figure 5.1: Venn diagram comparing best practices to practices reported in northern Greece

### 5.1.1 Existing Practices Not Observed in the Case Studies

This section describes practices observed in northern Greece that were not found in the case studies. Below, we describe each of the practices and provide examples of their implementation.

**Beekeepers' union:** According to Dr. Paschalis Harizanis, Director of the Laboratory of Sericulture and Apiculture at the Agricultural University of Athens and consultant to the Ministry of Agriculture, a beekeeping union connects beekeeping cooperatives to the government. The union, the Federation of Greek Beekeepers' Associations, provides physical and online resources to cooperatives. For example, it provides contacts for roadside assistance for beekeepers who travel across the country to move their hives. The federation's website also includes training materials and information for new beekeepers. The website lists events and seminars beekeepers can attend and has an area for beekeepers to sell or buy equipment from each other.

**Collaborating when moving hives:** Professional beekeepers move their hives across the country in order to improve hive productivity. This practice is enabled by collaboration between beekeepers and other agriculturalists. Interviews indicated professional beekeepers may relocate their hives in different areas across Greece around four to seven times a year. This ensures the bees have plenty of plants to pollinate and use to produce honey. Dr. Harizanis reported that honey production for a given year may double due to this practice. Moving hives also allows beekeepers to strategically place their hives in order to produce a desired variety of honey.

To help reduce the costs of travel, beekeepers have formed a community with each other. Honey Sithon, the largest honey cooperative in Greece by number of hives, shared that during April and May, many of their members travel together as nomads, living in their trucks in order to keep up with hive maintenance. Similarly, a beekeeper from Nea Kalikratia, an individual large scale beekeeper, said he collaborates informally with other beekeepers by sharing travel information and space in their trucks for transporting hives.

Interview respondents indicated Greek beekeepers also collaborate with other agriculturalists in a mutually beneficial relationship to gain access to land when moving their bees. Honey Sithon said many beekeepers locate their hives in olive groves. In exchange for use of the land, the beekeepers will often pay the landowners in the form of honey. Furthermore, since the beekeepers need the land cleared to place their hives, the beekeepers often clean the land from spring through fall. This gives the landowners the benefit of having the fields ready for olive harvest.

**Collaborative company:** The company Trofi employs a business model where multiple beekeepers work collaboratively. Konstantinos Georgakakis, a representative of Trofi, saw the opportunity to start a company when he realized one person cannot do everything on their own. Currently, there are three beekeepers working together in the company, each with separate roles. Working together enables the beekeepers to maintain 600 hives and sell honey in stores across Greece and Europe.

**Digital marketing:** Some Greek beekeepers make use of websites, social media, and e-stores to connect with customers in new ways. Trofi utilizes a website, Trofi.co, to provide background information about the company, its products, and beekeeping. Honey Sithon recently started using Facebook and Twitter to stay connected with customers. It also utilizes magazine and radio ads to



Figure 5.2: Screenshot from Honey Georgaka's Instagram story (2019)

promote its products. Similarly, Honey Georgaka, a family owned business in Chalkidiki maintaining 500 hives, grew its customer base through Instagram and Facebook. The business even held an Instagram giveaway to try to attract new customers. Honey Georgaka also recently opened an e-store on its website in order to reach customers all over Greece, as well as in five other European countries. These businesses demonstrate how having an online presence can allow a business to expand their customer base.

**Exporting products:** Interviews suggested beekeepers with a large number of hives and cooperatives may export products in spite of the high demand for honey in Greece. Trofi exports to locations only in Europe, such as Denmark, Sweden, and Germany, whereas Honey Sithon also exports beyond Europe. Honey Sithon exports 10% of its products to countries, such as China and the United States, by combining products from member beekeepers. Although it is a family owned business and not a cooperative, Honey Georgaka exports a small quantity of its honey to Germany. Beekeepers and cooperatives that are able to produce enough product are taking advantage of the international market by exporting honey.

**Networking:** Many beekeepers we interviewed discussed the community that forms between beekeepers. For example, Nikolia Avgena, a beekeeper and beekeeping professor at the American Farm School, mentioned that she discusses beekeeping over coffee with beekeeping friends and former students. The beekeeper from Nea Kalikratia discussed how professional beekeepers share information when they travel and help each other move hives. He also networks with farmers to know where pesticides are used, so he can avoid exposing his hives to pesticides. Altogether, networking allows beekeepers to gather information that might not be available elsewhere.

**Providing online resources:** Online resources may allow beekeepers to easily connect with other beekeepers and services. OMSE.gr is the Federation of Greek Beekeepers' Associations' website. Through the website, the federation offers services, such as a method for reporting stolen hives and information on who to contact for roadside assistance. The website also provides articles on topics such as hive insurance and current government funding opportunities. An online resource funded by the European Union, Melinet.gr, allows beekeepers to share beekeeping information and collaborate with other beekeepers. For example, beekeepers can advertise equipment and bee sales. They can also read about beekeeping tips and strategies. These resources compile and provide easier access to beekeeping information.

**Selling to stores, hotels, and wholesalers:** Some beekeepers sell their products to other businesses in order to reach more customers and guarantee all products are sold. Georgakakis shared that Trofi does not have any of its own stores, but instead sells honey through other stores. Honey Georgaka and a beekeeper from Nea Kalikratia both maintain about 500 hives. They indicated not all of their products can be sold just through their stores. To sell the rest of their products, they sell to other stores that then sell their products on their behalf. Honey Georgaka also sells its products to hotels which they then use in their business or sell to

customers. The beekeeper from Nea Kalikratia only sells about one quarter of his products through his store and sells the rest to wholesalers. Honey Sithon also sells to wholesale companies. For example, Attiki buys up to 300 tons of honey from Honey Sithon each year to sell under Attiki's name. Honey Sithon also sells their products through grocery stores and sells large metal canisters of honey targeted to restaurants and bakeries.

**Utilizing scientists:** Several respondents indicated collaboration with scientists is utilized to ensure the quality of bee products meets standards. Quality control of products in Greece is an area of concern within the beekeeping industry. A Honey Sithon representative, Stella Gerochimou, stated low quality honey is often mixed with high quality Greek honey and marketed as pure Greek honey. Honey Sithon uses scientists within the cooperative to test the quality of the honey coming from its members. Additionally, Dr. Harizanis stated beekeepers can collaborate with laboratories through the Ministry of Agriculture.

### 5.1.2 Observed Best Practices from the Case Studies

In this section, we explore what best practices synthesized from the case studies were already implemented in northern Greece. We divide this section into two categories: 1) best practices already widely implemented; 2) best practices with potential for growth.

#### Widely Implemented Best Practice

**Sharing equipment:** Beekeepers in northern Greece widely utilized one best practice, sharing resources. Almost every beekeeper we interviewed stated they collaborate with other beekeepers by sharing equipment. Avgena and a beekeeper from Nea Kalikratia revealed they share equipment with friends and other beekeepers in the area. Honey Georgaka described how it is part of a cooperative that shares equipment but not products. Overall, beekeepers who participated in sharing equipment, such as Honey Georgaka, the beekeeper from Nea Kalikratia, and Honey Sithon, provided evidence that this practice reduced their production costs because they do not need to buy their own equipment.

#### Best Practices with Potential for Growth

Some of the best practices already implemented in northern Greece were not used to their full potential. These practices could be improved upon in order to further benefit beekeepers. Below we discuss each of these practices and provide examples of their current implementation. We then discuss possible improvements for the practices.

**Agricultural extension services:** Classes and seminars, both free and paid, are offered to beekeepers in northern Greece through universities, beekeeping organizations, and cooperatives. These educational resources focus on teaching beekeeping practices. Georgakakis from Trofi explained he used such seminars to help develop his beekeeping skills. Although there are some

beekeeping classes available, there are no classes offered on how to market and sell bee products in particular, according to Dr. Konstantinos Tertivanidis, the Director at the Regional Development Fund of Central Macedonia and former Director at the Directory of Rural Development & Fishery for the Region of Central Macedonia. However, Agiris Georgakas from Honey Georgaka informed us that he attended some seminars offered by Google in Thessaloniki on general marketing strategies where he learned how to successfully use social media to the business's advantage. While some educational resources are available, no organized source of information through an agricultural extension has been reported.

**Agritourism:** The beekeeper from Nea Kalikratia, Avgena, Honey Georgaka, and Honey Sithon all market and sell their products at honey and food festivals. They described how festivals allow them to attract new customers and network with other beekeepers. Similarly, Honey Sithon uses apitourism to attract customers by giving tours of its facility. Anel, a beekeeping equipment company, also saw the opportunity apitourism could provide. Three years ago, the company opened Anel Honey Park right outside the city of Thessaloniki. The park hosts tourists, school field trips, and birthday parties. It offers apitherapy and has a store with bee products, bee themed gifts, and beekeeping equipment. The park allows the company to increase its income through offering extra services to the public. Honey Sithon and Anel, as the only businesses to provide facility tours and a honey park respectively, indicate the opportunity for the apitourism sector to grow in northern Greece and beekeepers to expand their businesses.



Figure 5.3: Anel Honey Park

**Collaborating with business experts:** Some beekeepers utilize experts with different business backgrounds to improve their business strategies. Honey Georgaka, Honey Sithon, and Trofi indicated they participate in this collaborative practice. One of the sons of the Georgaka family, Argiris, helped take over the business and uses his sales and marketing background to market their products and run one of their stores in Chalkidiki. Honey Sithon also indicated it utilizes professionals from different backgrounds in its business. Its director has a background in business and assists a managing council in making business related decisions for the cooperative. Furthermore, Honey Sithon employs two accountants in its staff of 29 employees. Similarly, Trofi consults with a marketing expert. However, although his business is large with over 500 hives, the beekeeper from Nea Kalikratia lacks the business background or personnel to increase his sales and reach a larger customer base. This indicates other beekeeping businesses may



benefit from collaborating with business professionals to improve their marketing, sales, and financial practices.

**Government policies:** Currently, laws protect Greek beekeepers in areas pertaining to product quality and labeling, pesticide control, and hive theft. However, stakeholders identified areas where they could benefit from better law enforcement and more policies. The current set of beekeeping laws resembles the laws imposed by the European Union, as all Greek laws must be in accordance with European Union laws. This can lead to discontent as countries who do not participate in beekeeping as much may help enact laws that favor honey importers over beekeepers, according to Dr. Harizanis. He says these laws regulate the production, packing, labelling and distribution of bee products. Avgena shared that the government provides protection for beekeepers when marketing their products by imposing regulations on honey sales through labeling criteria on product quality. Previously, this existed only for honey, but the government recently added protection for royal jelly as well. In addition to laws regarding bee products, Dr. Tertivanidis stated that the European Union banned some pesticides harmful to bees. Furthermore, pesticides that harm bees must be sprayed at night. To address the risk of hive theft, a policy requires that hives are branded with a beekeeper's unique identification number.

However, multiple beekeepers indicated these policies are poorly enforced. Honey Sithon identified an issue with honey quality control due to limited regulation and enforcement of



Figure 5.4: Hives at the American Farm School in Thessaloniki

labeling criteria. Despite policies protecting against pesticides, several stakeholders identified the presence of pesticides as a challenge they face. Therefore, improvements could be made in this area. Beekeepers also expressed concern about hive theft. In the past, hive branding adequately deterred theft, but it is no longer effective. Further laws and enforcement regarding hive theft could help protect beekeepers from such losses. According to Dr. Harizanis, the government is willing to implement new policies, indicating possibility for improvement.

**Government resources:** The Greek government currently offers resources to beekeepers who qualify as professionals by having at least 150 hives. The government gives 8.5 million euros per year for beekeeping. Half of this money comes from the Greek government while the European Union provides the other half. The government has been providing these funds for the past 19 years through direct and indirect subsidies to agriculturalists. Part of the funding goes towards

helping beekeepers replace up to 10% of their hives each year. Additionally, beekeepers may receive four to five euros per hive each year for travel expenses. They may also declare travel between hive locations as a business expense on their tax forms. The government will sometimes provide special funding upon request for technical analysis and processing of honey. It also provides insurance for hives that covers up to two diseases per year or flood damages. Furthermore, Dr. Harizanis indicated laboratories provide help to beekeepers through the Ministry of Agriculture. The Central Macedonia regional government offers a rural development program to help farmers with production by funding small businesses for five years to help them get started. It also finances some educational programs at vocational schools for beekeeping. Currently, most government offerings appear to be financial.

However, beekeepers felt government assistance could be improved in a variety of ways. Honey Sithon and Honey Georgaka expressed a need for further funding to replace equipment and reduce production costs. Similarly, the beekeeper from Nea Kalikratia felt that tax breaks, particularly on gasoline, could help reduce costs associated with production. Some stakeholders experience difficulties accessing these government provided resources. For example, Georgakakis explained that Trofi does not receive government help in some areas, such as packaging, because the company does not meet the criteria for the programs. It could benefit Trofi and other beekeepers if beekeepers could qualify for more agricultural funding opportunities. Furthermore, the beekeeper from Nea Kalikratia explained it can be difficult for beekeepers who are not members of a cooperative or other organization to access government funding. Additionally, Avgena expressed a need to help promote products produced from research conducted in labs. These products can offer quality and benefits unique to Greece, and could benefit from better marketing.

**Mentorship program:** During the interviewing process, we asked stakeholders if they knew of any mentorship programs in place. Only Georgakakis from Trofi mentioned working with a mentor. Georgakakis described collaborating with an experienced beekeeper who mentored him when he first learned about beekeeping. A mentorship program could be beneficial to other Greek beekeepers because it could provide less experienced beekeepers with personalized lessons and the opportunity to learn one-on-one from a more experienced beekeeper.

**Selling products collaboratively:** Only Honey Sithon indicated that it combines products to expand its market. Currently, 47 member beekeepers and around 30 contract beekeepers provide products for sale under a unified brand. Combining products allows Honey Sithon to target a variety of markets, such as restaurants and international customers. The beekeeper from Nea Kalikratia described how some beekeepers will share honey with each other so each beekeeper will have a variety of honey. However, these beekeepers do not share products with the goal of expanding their markets. This suggests that combining products is not widely implemented in northern Greece.

### 5.1.3 Best Practices Not Observed in Northern Greece

Some of the best practices from the case studies not observed through the interviews could be implemented to help improve the bee economy by promoting collaboration.

**Encouraging community involvement and awareness of agriculture:** Interviews revealed no evidence of programs encouraging community involvement and awareness of agriculture. No stakeholders described programs like the ones seen in the Ljubljana or Berlin case studies where citizens were educated about beekeeping. If implemented, these programs could increase citizens' awareness of local beekeepers and the challenges they are facing. This awareness could increase the amount of business local beekeepers get. Additionally, these programs could encourage citizens to plant more flowers and use fewer pesticides, which may lead to healthier and more productive bees.

**Bee friendly environmental planning:** Dr. Harizanis provided the only reference to bee friendly environmental planning when he mentioned the government plants bee friendly flowers. However, we collected insufficient evidence to suggest that this practice is utilized in northern Greece. When asked if there are environmental planning policies, Dr. Tertivanidis did not indicate any. Additionally, some beekeepers identified a lack of available plants and the presence of pesticides as challenges when beekeeping. Implementation of this practice could help increase the productivity of honeybees and the production of honey.

## 5.2 Best Practices to Address the Wants and Needs of Beekeepers

This section presents recommendations to improve collaborative practices in beekeeping identified through a benefits chart with an integrated frequency analysis, as seen in in Table 5.1. We include challenges that might hinder the implementation of these practices and summaries of stakeholders' responses. Based on the feedback, we describe possible approaches for addressing concerns and modifying the suggestions.

We identified 22 wants and needs of beekeepers using the information gathered through the interviews. The most mentioned wants and needs included: Improved quality control, protection against colony theft, expanding markets, and reducing pesticides. The benefits chart, seen in Table 5.1, includes the full list of wants and needs. The most frequent wants and needs can be seen on the left with their frequency indicated below. Due to the small number of interviewees, the most mentioned wants and needs cannot be considered the most important for all stakeholders but were considered important during suggestion making.

		Wants and Needs of Stakeholders													Number of Wants or Needs Addressed									
		Improved Quality Control	Protection Against Colony Theft	Expand Markets	Increased Pesticides	Mentorship	Reduced Government Funding	Reduced Business Costs	Increased Plants	Reduced Taxes	Better Training	Better Accessability to Government Resources	The Land Locator	Business Education		Government Help with Marketing	More Reliable Information	Increased Exports	Fair Consumer Prices	More Efficient Cooperative Model	Agritourism	The Checks	International Exposure	
Best Practices for Recommendation	Number of Stakeholders Who Expressed The Want or Need	6	5	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Government Resources				X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Agricultural Extension Services				X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Mentorship Programs				X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Government Policies									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Collaborating with Business Experts								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Selling Products Collaboratively								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Community Involvement										X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Agritourism																							
	Bee Friendly Environmental Planning																							

Table 5.1: Benefits chart showing the benefits provided by each practice

**Government resources:** Government provided resources could help address 13 wants and needs of the beekeeping community. The government already offers funding for some expenses, such as equipment and travel, but some producers struggle to access this funding. Similarly, some resources are unavailable to beekeepers with different backgrounds. Beekeepers often have to meet certain criteria to qualify for resources, which limits beekeepers' access to government assistance. Many other wants the government can address deal with knowledge, such as a lack of export experience or a lack of business and marketing knowledge. The government could increase accessibility to resources and provide new forms of funding to help beekeepers succeed.

- **Online portal for funding requests:** An online portal for funding requests could address the difficulty of obtaining funding. The portal can guide an applicant through the process with an easy to use interface accessible anywhere with internet. We received mainly positive feedback on this suggestion, indicating this fast and easy service would be ideal. However, respondents expressed concerns about farmers with limited use of electronics and the work required to set up and maintain such a resource. While not all beekeepers use electronics, an online resource could expand accessibility, especially for the younger generation of beekeepers.
- **Making government support available to more beekeepers:** Modifying the criteria for participation in government programs would make resources available to a broader range of beekeepers. Broader criteria would benefit beekeepers, such as Georgakakis, who do not meet the criteria for the government's agricultural funding programs. Stakeholders believed this suggestion would benefit new beekeepers especially. However, the risk that a business may remain dependent on subsidies and not become self-sufficient concerned one respondent. To address this concern, subsidies may be designed specifically for new businesses to provide aid for only a set amount of time, enabling a business to initially grow and then become self-sustaining.
- **Educational resources:** To address the lack of education of some beekeepers and unreliable information sources, the government could maintain a website listing reliable educational resources and seminars. The government may also host its own classes and seminars for beekeepers. Stakeholders indicated that these educational resources would offer value to old and new



Figure 5.5: Beekeeping class held at the American Farm School in Thessaloniki

beekeepers. Educational resources could help establish good beekeeping practices and keep beekeepers informed of new scientific developments. One stakeholder suggested conducting classes and seminars in the late fall and winter seasons when a beekeeper does not have as many responsibilities with the hives.

- **Online resources:** Helpful online resources may include a database of landowners who are willing to host hives for travelling beekeepers and a database of regions to avoid due to pesticide use. To maximize the value provided, the government should keep such a website with databases maintained. The owners of Melinet.gr have not updated the website since 2013, which limits its usefulness. One stakeholder expressed through the questionnaire that beekeepers would find these resources useful. However, a database of pesticide use that is not thorough and widely implemented may prove ineffective. The neighbor of a landowner hosting hives may use pesticides and, since bees cannot be restricted to one area, the pesticides may still affect the bees. Therefore, the database would likely not be fully effective unless it is mandatory for all landowners to report pesticide use. A database listing pesticides seems infeasible at this time but providing a database of landowners willing to host hives could benefit beekeepers.
- **Hive checks:** The government could provide hive checks to beekeepers to mitigate the spread of diseases and pests. This would help protect hives in the area from harm. Hive checks received mixed reactions from the questionnaire respondents. One stakeholder expressed a positive reaction because they felt it would limit the spread of diseases. However, another respondent reacted negatively since beekeepers are constantly moving, making hive checks difficult to implement. They felt it could only be implemented on islands where beekeepers do not travel as far. For this reason, we do not believe hive checks would be practical to implement in northern Greece.

**Agricultural extension services:** An agricultural extension service may help address eight wants and needs of beekeepers in northern Greece. Beekeepers may benefit from an agricultural extension because it could provide many resources in one organized place to improve accessibility. The government or some other independent organization could provide this service. The extension service can offer better resources and training on beekeeping practices, how to export and market products, and how to best utilize government resources. An extension could also offer a mentorship program to help new beekeepers gain first-hand experience from a knowledgeable source of information. However, implementing an agricultural extension requires organization and resources. Enrollment fees may help offset these costs. Another limitation to such a program is that beekeepers unwilling to share their knowledge with others could hinder mentorship opportunities due to a fear of helping their competition.

This suggestion received positive feedback from the respondents. One stakeholder believes that agricultural extensions would increase the revenue of producers. Another stakeholder mentioned this would be useful for beekeepers, especially new ones. One questionnaire respondent

suggested the services be subsidized because new beekeepers may not be able to pay for services. One concern was that the extension would not be located close enough to beekeepers. To address this concern, the extension program could offer classes and services in multiple locations. Furthermore, the extension program could offer business related classes that do not require hands on learning online.

**Government policies:** Government policies could aid in bee product quality control, protection against hive theft, more plants, less pesticides, reduced taxes, and fair consumer prices. Most respondents expressed concern about quality control of bee products. Low quality honey in the market makes it difficult for high quality producers to maintain competitive prices and sell their products. Similarly, beekeepers expressed hive theft as an issue. While tracking devices are an option, they are expensive, costing around a couple hundred euros per hive, potentially doubling a hive's cost ("My Apiary", n.d.). Such high costs may make this option infeasible for many beekeepers. Additionally, most tracking devices give off radiation that can disorient bees, cause the queen to produce fewer eggs, and lead to reduced honey production (Nelson, 2010; "Beehive anti-theft tracking device", n.d.). Therefore, this practice may bring about more damages than benefits. Additionally, beekeepers mentioned lack of enough plants and the use of pesticides as issues. A beekeeper from Nea Kalikratia expressed a concern about the high markup on products between what the producer is paid and what the customer pays.

- **Increased quality control:** The government may address quality control by imposing more severe penalties. Stricter penalties could increase the perceived risk of mislabeling and hopefully dissuade mislabeling. Increased enforcement of the laws may also help. The government may achieve this through increased testing of honey, though this implementation takes a lot of resources and labor. A method for reporting suspected infringements may help alleviate this issue. Knowledgeable beekeepers can aid in the identification of honey that does not meet standards. This way the government would not need to concern itself as much with testing every product. Furthermore, the only labeling requirement currently in place is to list the countries where the honey came from. More requirements for labeling, such as identifying added sugars or other modifications, may be implemented to provide more protection to producers. Questionnaire respondents felt beekeepers would greatly benefit from this practice as it addresses one of the biggest problems, fake honey, and protects both consumers and beekeepers.
- **Hive theft relief:** Stricter penalties may dissuade hive thieves. Additionally, the current insurance policy that covers hive loss due to diseases and flooding could expand to include hive theft. This could help protect beekeepers from the losses associated with theft. Questionnaire responses expressed that hive theft is a big problem to address in order to protect producers. However, it is difficult to police hive theft because hives are scattered out in the open. Furthermore, one respondent believed it would be more helpful to provide subsidies for microchipping hives rather than providing insurance coverage. However, we do not believe these chips would provide added protection to beekeepers. A

chip would allow a hive's owner to be identified if scanned. However, hive branding theoretically already offers this protection.

- **Plant and pesticide policies:** Policies that encourage a greater presence of plants in areas that are lacking through incentives or imposed requirements could help increase the productivity of honeybees. Policies that prohibit pesticides can protect bees and make more land safe for beekeepers moving their hives. This recommendation received positive feedback from respondents. Tertivanidis, a government official, stated there is possibility for the government to plant more bee friendly plants. Another stakeholder expressed that policies against pesticides would benefit beekeepers, but opposition to banning pesticides might prevent such policies from being enacted. Despite this challenge, we believe it is still worth making the effort in order to protect bees and promote hive productivity.
- **Tax breaks:** More tax breaks for beekeepers could help reduce production costs, allowing them to price their honey more competitively. Questionnaire respondents believed this suggestion would be beneficial.
- **Regulation of product markups:** Laws that establish a maximum product markup could protect consumers from unreasonably high prices and beekeepers from businesses paying them too little for their product. There were mixed responses from stakeholders about this suggestion since reducing markups could affect businesses. Reducing the price of goods could make it difficult for a business to survive. Due to this concern, we do not believe this suggestion would provide adequate value compared to the potentially adverse effects on the market.

**Collaborating with business experts:** Collaborating with business experts could help address six of the wants and needs of beekeepers: Expand their markets, reduced business costs, reduced difficulty of selling individually, business education, increased exports, and a more efficient cooperative model. Collaborating with business experts may allow beekeepers to focus on beekeeping while still running a profitable business by offloading business responsibilities to professionals. Honey Sithon, Honey Georgaka, and Trofi, who already have employees with different business backgrounds, could further develop this practice by utilizing experts of a greater variety of business backgrounds.

A reluctance to initiate collaboration with people beyond a beekeeper's current business may generate some resistance to this practice. Financial circumstances may also affect the implementation of this practice since not all beekeepers are able to sustain more employees, as discussed by the beekeeper from Nea Kalikratia. Beekeepers may overcome this issue by making the practice mutually beneficial. Beekeepers could provide some of their products in return for a consultation with a business expert. In this relationship, the expert receives bee products, while the beekeeper receives help improving their business. Participants of these collaborative



relationships can negotiate the terms of their agreement based on their individual wants in order to provide benefits for both parties involved.

Respondents reacted positively towards this suggestion. One expressed the benefit that exchanging bee products for business help would provide by eliminating the monetary cost of such services. However, another stakeholder expressed concerns that the knowledge of how to market may not be easily compensated through products. Instead, beekeepers may use products to offset the cost of the service.

**Selling products collaboratively:** Selling collaboratively can help beekeepers expand their markets, reduce business costs, reduce the difficulty of selling individually, and increase exports to increase their profits. Beekeepers want to produce enough goods to satisfy their customers and expand their market. The weather can cause variation in product volume each year making this difficult. Furthermore, Honey Sithon expressed interest in exporting to more countries but cannot do so without more producers. Increased collaboration to market and sell products could address the need to reach new customers. Case studies indicated combining multiple sources of product helps ensure beekeepers have enough product, even if a producer has a bad season.

Selling products collaboratively additionally offers the benefit of reduced business costs due to marketing and sales expenses. A beekeeper does not need to bear all of the expenses related to owning and running a shop if they share that shop with other beekeepers. This also reduces some of the responsibilities associated with marketing and sales, lessening the challenges associated with selling individually.

However, many beekeepers are reluctant to market with others. Educating beekeepers on the benefits of combining their products to sell collaboratively may encourage them to join cooperatives or informally collaborate with other beekeepers to sell their products. Resources could be made available to educate beekeepers on the benefits and costs associated with participating in cooperatives, as well as the possibilities regarding other methods of collaborative selling.

Any cooperative selling model should respect the needs of each producer to ensure continued membership. A beekeeper in Nea Kalikratia shared his reasoning for leaving a cooperative. He experienced long delays before receiving payments for his product and felt the costs associated with buying equipment for the cooperative were greater than the costs of selling alone. To help attract new members and retain existing ones, cooperatives should consider these concerns. Expanding membership may require adjustments to the traditional cooperative model to provide better experiences to a range of members.

Stakeholders' feedback on this suggestion was very positive. One respondent suggested incentivizing cooperatives through methods such as reduced taxation or subsidies.

## 6. Conclusions and Recommendations

In this chapter, we summarize the best practices synthesized from the case studies. We then propose recommendations to improve collaborative practices in beekeeping based on the information and feedback we gathered. We describe possible implementations of the recommended best practices, their limitations, and what wants and needs they could address. We conclude by discussing possible opportunities for future work.

### 6.1 Summary of the Best Practices Synthesized from Case Studies

We explored nine agricultural case studies from around the world with an emphasis on collaboration. We then identified collaborative best practices and synthesized categories of these agricultural best practices from the case studies. Below, we describe the four categories with corresponding best practices that provided evidence of success in promoting collaboration, leading to economic benefits.

#### **Collaborative marketing to improve resource accessibility**

3. Combining resources through the cooperative model: *Agriculturalists can combine their products to reach larger markets. They may also share equipment to reduce their individual production costs.*
4. Utilizing business experts for improving marketing practices: *Utilizing business experts allows agriculturalists to focus on production, while business professionals manage the marketing and distribution of their products. This practice could help agriculturalists increase their production, while business experts help them reach more customers.*

#### **Education for increasing the competence of agriculturists**

3. Providing educational opportunities through agricultural extension services: *Agricultural extension services provide a centralized collection of educational programs to agriculturalists, which may improve accessibility. These services demonstrated success in improving production and reducing poverty through collaborative education.*
4. Agricultural mentoring programs: *Mentorship programs provide an opportunity for new agriculturalists to gain hands on experience from knowledgeable people in their field. Mentoring can also aid in networking between agriculturalists and forming a sense of community.*

#### **Government involvement in agricultural improvement**

4. Governmental policies to support beekeeping: *Government policies regarding beekeeping ensure the safety and well-being of the community, beekeepers, and bees. Policies may address hive location, hive registration, and conflict resolution.*
5. Government-provided resources and services: *The government may provide funding, educational programs, or other resources to agriculturalists in order to help them succeed.*

6. Bee friendly environmental planning: *The government can help provide a safer environment for bees by reducing pesticides and planting bee-friendly plants.*

### **Engaging the community in agriculture**

3. Encouraging community involvement and awareness of agriculture: *Encouraging citizens to embrace agriculture and participate in the solution helps raise awareness of local agriculture. Community members interested in local agriculture may be more likely to purchase goods from their local producers.*
4. Using agritourism to attract business: *Agriculturalists may attract new customers to their businesses by providing services to engage the community. Some activities may include holding tours, having tasting sessions, or attending festivals.*

## **6.2 Recommendations**

Greece implements numerous best practices from around the world to varying extents. Interviews indicated that many best practices could use strengthening. Based on the information and feedback we gathered, we make recommendations to improve collaborative practices for beekeeping in northern Greece. We present five suggestions to address the wants and needs of the stakeholders.

### **Government resources**

This category would address numerous needs: Increased government funding, mentorship, reduced business costs, reduced difficulty of selling individually, better training, better accessibility to government resources, hive land locator, business education, government help with marketing, more reliable information, increase exports, hive checks, international exposure.

Specific implementation ideas include:

- **Online portal for funding requests:** An online portal for funding requests could address the difficulty of obtaining funding. The portal could guide an applicant through the process with an easy to use interface accessible anywhere there is internet.
- **Increased resource availability:** Modifying the criteria for participation in government programs would make resources available to a broader range of beekeepers. Subsidies designed for new businesses could provide aid for only a set amount of time to enable a business to initially grow and then become self-sustaining.
- **Educational resources:** To address the lack of education of some beekeepers and unreliable information sources, the government could maintain a website listing reliable educational resources and seminars, or host their own. Classes and seminars could be conducted in the late fall and winter seasons, when a beekeeper does not have as many hive responsibilities.

- **Online resources:** Helpful online resources may include a database of landowners who are willing to host hives for travelling beekeepers. When providing an online resource, it is important to keep the website maintained.

## Agricultural extension services

This category would address numerous needs: Mentorship, reduced business costs, reduced difficulty of selling individually, better training, better accessibility to government resources, business education, more reliable information, increased exports.

Specific implementation ideas include:

- **Business education:** An extension service can provide better resources and training on beekeeping practices, how to export and market products, and how to best utilize government resources.
- **Mentorship program:** An extension service could offer a mentorship program to help new beekeepers gain first-hand experience from a knowledgeable source of information.
- **Subsidies to fund services:** Subsidies for extension services could help new beekeepers unable to pay for services, as they may not yet have stable income.
- **Multiple locations for services:** To increase accessibility to beekeepers, extension services could have multiple locations. An extension program could offer business related classes that do not require hands on learning online.

## Government policies

This category would address numerous needs: Improved quality control, protection against colony theft, reduced pesticides, increased plants, reduced taxes, fair consumer prices.

Specific implementation ideas include:

- **Increased quality control:** Stricter penalties could increase the perceived risk of mislabeling honey and hopefully dissuade the act. Additionally, enforcing quality control through increased government testing of honey could address this need. However, this implementation requires a lot of resources and labor. A method for reporting suspected infringements could help alleviate this issue. Furthermore, the only labeling requirement currently in place is to list the countries where the honey came from. More requirements for labeling, such as identifying added sugars or other modifications, could provide more protection to producers and consumers.
- **Hive theft relief:** More severe penalties for hive theft could dissuade potential thieves. Additionally, the current insurance policy that covers hive loss due to diseases and flooding could expand to include hive theft to help protect beekeepers from the losses associated with theft.
- **Plant and pesticide policies:** Policies that encourage a greater presence of plants in areas that are lacking through incentives or imposed requirements could help increase the

productivity of honeybees. Policies that prohibit pesticides can protect bees and make more land safe for hives.

- **Tax breaks:** More tax breaks for beekeepers could help reduce production costs, allowing them to price their honey more competitively against imported honey.

## **Collaborating with business experts**

This category would address numerous needs: Expand markets, reduced business costs, reduced difficulty of selling individually, business education, increased exports, more efficient cooperative model.

Specific implementation ideas include:

- **Mutually beneficial relationship:** Beekeepers could provide some of their products or a combination of products and money in return for a consultation with a business expert

## **Selling products collaboratively**

This category would address numerous needs: Expand markets, reduced business costs, reduced difficulty of selling individually, and increased exports.

Specific implementation ideas include:

- **Encourage collaboration through education:** Educating beekeepers on the benefits of combining their products to sell collaboratively may encourage them to join cooperatives or informally collaborate with other beekeepers to sell their products. Resources could be made available to educate beekeepers on the benefits and costs associated with participating in cooperatives, as well as the possibilities regarding other methods of collaborative selling.
- **Respect members' needs:** With any cooperative selling model, respecting the needs of each producer helps ensure continued membership. Expanding membership may require adjustments to the traditional cooperative model to provide better experiences to a range of members.
- **Incentivize participation:** Incentivizing beekeepers through methods such as reduced taxation or subsidies may encourage more beekeepers to join cooperatives.

Through these suggestions, the beekeeping economy in Greece may expand and grow. This project did not investigate how to best implement the suggestions. Further work will be needed to identify optimal implementations for northern Greece. Other regions across the globe may also benefit from the collaborative best practices for beekeeping synthesized through this project. Future work may include exploring how to adapt these best practices to other cultures and economies. Similarly, further research into the practices beekeepers use in northern Greece and how they can be applied elsewhere may provide more depth and understanding of such practices.

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## Appendix A: Interview Protocols

### Introductory Remarks

Hello, we are students from Worcester Polytechnic Institute working on a research project to help promote a bee economy in northern Greece through collaborative best practices. [Introduce ourselves individually]. Our project aims to financially benefit local beekeepers through collaboration. We will be coming up with different best practices that could be implemented in the area to foster collaboration and develop the bee economy. We would be happy to send you our findings at the end of our project if that interests you!

### Consent Statement

Thank you for your time. This interview is entirely voluntary. You may choose to not answer a question or end the interview at any time. You also have the option to retract any statements that you don't want included in our report. We will also be sending you a draft of our work where the information you provided can be seen before we publish it, in case you would like to make any changes. You may choose to be recognized, remain anonymous, or not be included in the publication. Before we start, are you okay with us taking notes? Are you okay if we voice record the conversation?

### Closing Remarks

Do you have any contacts who may also be willing to talk with us?

Thank you for your time. We value your input and participation. Can we have your email to share a draft of our work with you for your approval? Also, would you be willing to follow up with us at a later time to provide feedback on our proposed solutions? If so, would you be interested in participating in a focus group or interview? If not, would you be willing to participate in an online survey? Thank you again.

### Sample Interview Questions for Beekeepers

1. How long have you been beekeeping?
2. How many hives do you have?
3. What is your motivation for beekeeping?
4. What sort of environment are you conducting your beekeeping in, such as in the city, on the countryside, or the suburbs?
  - a. Does this environment affect your practices at all?
5. What kind of products do you sell if any?
  - a. Is this a primary or supplementary source of income?
  - b. How much product do you produce and sell each year?
  - c. Where do you sell these products?

- d. How do you market these products?
  - e. What strategies have been most effective for you? Are there any display techniques, advertising methods, or market locations that have been most successful?
  - f. What are your most popular bee related products sold?
6. Do you have any unique strategies for beekeeping?
  7. What has been your biggest challenge as a beekeeper?
  8. Do you engage with the public in any way, such as through agritourism, festivals, etc.?
  9. How would you like to engage with the public community in new ways, if at all?
  10. What beekeeping resources does the government offer you and do you use any of them?
  11. Are there any resources or services you wish the government would provide?
    - a. For example, we have seen that some governments provide hive maintenance checks. Is this something you would be interested in?
    - b. Additionally, some government or agricultural extension programs provide beekeeping classes. Do you feel you would benefit from this or would have benefited as a new beekeeper?
  12. Are there any other resources you wish you had access/ better access to?
  13. Are you apart of any sort of beekeeping organization, community, or club? If so, please explain?
  14. Do you participate in any other informal methods of collaboration?
  15. Would you be willing to share your knowledge with other beekeepers and collaborate with them?
  16. Would you be interested in participating in a mentorship program?
  17. Would you be interested in combining business resources with other beekeepers to meet a higher demand and possibly export products?
  18. Would you be willing to help organize a group to do so?
  19. Would you be interested in participating in more community events to promote your business and products?
  20. Would you be interested in opening up your apiary to the public to provide unique services to them such as hive tours, demonstrations or apitherapy?
  21. Do you have any suggestions about how to encourage new beekeepers or support beekeepers?
    - a. What are your top three pieces of advice for a new beekeeper?

## Sample Interview Questions for Government Officials

1. What is the government's current interest in urban beekeeping?
2. Are there any beekeeping policies in place?
  - a. What are these policies?
  - b. What lead to the creation of these policies?
  - c. Have these policies been successful?
3. Have there been any beekeeping policies that have been considered but were rejected?
  - a. What were these policies?

- b. Why were they rejected?
4. Would the government be open to adopting new beekeeping policies?
    - a. What obstacles would prevent new policies from being enacted?
  5. Would the government be willing to provide any resources or services to beekeepers to help support their practices and businesses?
    - a. To what extent would the government be willing to provide resources? Ie. if money, a dollar amount; if a resource, what and how much
  6. Would the government be willing to help establish and maintain collaborative programs for beekeepers?
  7. Would the government be willing to organize events for beekeepers to engage with the public?
  8. Would the government be willing to make educational resources or classes available to the public?
  9. Would the government be willing to help market Greek bee products?

## Appendix B: Agricultural Case Studies

### Berlin Case Study

A case study on Berlin revealed trends in the movement towards urban beekeeping and provides details on Berlin's beekeeping initiative. Between the 1990s and 2006, the number of beekeepers steadily declined but has since rebounded by 53%. In 2008, concern about the use of neonicotinoids and their impacts on bees hit the news. Interest in beekeeping peaked in 2013. The trend in urban beekeeping increased in 2011, creating a shift in the beekeeper demographic. What once was considered an older man's hobby attracted the interest of women and younger people. This new generation of beekeepers found excitement, fulfillment and an opportunity to live out alternative green lifestyles through beekeeping. To accommodate this trend, beekeeping associations have made efforts to welcome in new members through varied means, including increasing social events, providing online resources, and sponsoring new beekeepers. For those who do not want sponsorship, blogs and forums have offered ample resources to beginning beekeepers. One beekeeping method that seems to attract new beekeepers is the natural beekeeping trend that gives the impression of reduced financial and time costs. To meet this urban beekeeping trend, Berlin took action with their "Berlin summt!", which translates to "Berlin is buzzing", initiative that won the "Call for Future" campaign. The initiative seeks to promote a positive culture with bees and humans living side by side in harmony through methods such as installing beehives on the roofs of important buildings throughout the city. Educational programs were established to target educators, students, and the underprivileged who can use the skills they learn to help get ahead in life (Lorenz & Stark, 2015). The marketing approach adopted is of particular interest. An intermediate distributor alleviates the burdens of a beekeeper associated with marketing their product. There are two primary companies that will purchase the honey from local beekeepers. These companies then take care of labeling and selling the honey online, to chain retailers and local stores (Lorenz & Stark, 2015). This marketing approach helps increase the visibility of the products with little to no effort on the beekeepers' part. This may also serve to reduce competition as each beekeeper profits from selling their product to these distributors rather than the beekeepers fighting for the attention and loyalty of customers.

### Boston Case Study

Boston is one of the cities at the forefront of urban beekeeping, promoting the activity through government support as well as providing educational resources. Despite Boston just having legalized beekeeping in 2014, it is able to take advantage of a variety of services offered by the Massachusetts Department of Agricultural Resources (MDAR). The MDAR's Apiary Program provides several services that seek to help beekeepers maintain healthy honeybee colonies. In addition to researching incidents of colony death, the department also offers inspections to ensure that local beekeepers' hives are free of pests and pathogens ("Apiary Program (honey bees)", n.d.). The MDAR offers educational resources in a variety of areas including topics such as, disease control, hive transportation, and other bee management practices (Massachusetts Beekeepers Association, 2014). Thanks in part to these government initiatives, Boston has an

estimated 40,000 to 45,000 hives belonging to some 4,000 to 4,500 beekeepers (“Apiary Program (honey bees)”, n.d.).

Beyond the government support, Boston also contains companies that focus on promoting beekeeping in the city. One company in particular, Best Bees, is located in the city and works to establish new hives as well as help maintain current hives since 2010. With a variety of support networks, beekeeping in Boston has increased tremendously. Boston citizens benefit from the research and educational opportunities that comes with this increase in urban beekeeping. Research scientists are using beehives in the cities to study diseases and social behavior while schoolteachers are incorporating apiaries into their lesson plans (Hughes, 2018). Boston successfully promotes beekeeping in the city through its government support in legalizing the activity as well as providing educational opportunities for its citizens.

## Honey Sithon

Honey Sithon, also known as the Agricultural Beekeeping Cooperative of Nikiti in Chalkidiki, is one of the largest cooperatives in Europe. It was first established in 1952, and it has been successful for a few reasons. One reason is the climate is perfect for beekeeping because of the variety of flora that thrive in Greece. Another reason is due to its up-to-date infrastructure and high level beekeeping skills. Sithon opened its own packaging plant in the 1980s, and it started a honey quality laboratory. Since then, it has become one of the most successful and sophisticated apicultural cooperatives in Europe (“Honey Sithon”, n.d.). Beekeepers of the cooperative move the hives throughout Greece to follow the blooming flowers. Honey Sithon produces about 10% of all of Greece’s honey production. While the cooperative focuses on sales in Greece, it also exports some honey in order to expand its customer base. While Sithon Honey can be found in main chain grocery stores across Greece, it has also opened three retail stores in Thessaloniki.

Honey Sithon’s honey has received many awards both nationally and internationally. Its products have honors such as its Blossom Honey being awarded the highest distinction of three stars in 2011, 2015, and 2018. Its Pine Tree Honey has also received two stars in 2010, 2014, and 2017 from the International Taste and Quality Institute (S. Gerochymou, personal communication, February 7, 2019).

## Ljubljana Case Study

The city of Ljubljana received the “European Green Capital” award in 2016 (Dakskobler, 2018) and “Most Bee-Friendly Municipality” in 2017 (“The Bee Path”, n.d.). The city’s success seems to come from its initiative being a movement and more than just implemented programs. The city claims that “It is not just a path, it is a movement of like-minded people caring for the well-being of bees in the city with very diverse activities” (“The Bee Path”, n.d.). The solution focuses on the city as a whole and takes advantage of what every person can offer. The program they set forth is a coalition of 35 member organizations all aimed at promoting beekeeping and bee education in the city. Member organizations range from academic institutions to non-profit

organizations, beekeeping associations, and private companies. Their goal is to demonstrate the importance of bees to survival and food safety, the significance of beekeeping to the city's culture, and how important honey is to their diet ("Ljubljana's bee path", n.d.). The planting of bee friendly perennials and the establishing of 13 terraces above the city created a healthy environment for the bees ("Bee path", n.d.). They were the first European city to ban neonicotinoids. They also banned glyphosate pesticides, which could be why they also claim to have no losses due to pesticides or colony collapse disorder (Dakskobler, 2018). A network of support and community exists between the beekeepers, city, members of Bee Path, and the community. The city has helped establish five new beekeeping businesses ("Bee path", n.d.). The beekeeping association provides honey quality testing to independent beekeepers (Leadbeater, 2017). Promotional and educational materials engage the community and encourage them to plant bee friendly flowers in their own gardens ("Bee path", n.d.). Events are held at various beehives and stands, attracting business and developing a social network ("Bee path", n.d.). These are all just the surface of Ljubljana's accomplishments, the full depth of which is beyond the scope of what may be presented here. By creating the bee friendly culture, they have also fostered an environment for apitourism. Visitors may come tour the Bee Path, visiting local hives and museums. They can buy products and truly experience the beekeeping culture. For example, some beekeepers have integrated an element of apitherapy into their hives where visitors may lie down and watch the bees while breathing in the sweet air from the hive through a mask (Leadbeater, 2017). By involving the community and attracting tourists, Ljubljana has created an environment where their beekeepers can prosper through various economic channels.

## Turkish Case Study

Turkey is the fourth largest honey producing country. It is also second in the number of beehives with approximately 4.3 million hives. Beekeepers in Turkey have several options for how to sell their honey. The Turkish Central Union of Beekeepers has also been active in supporting the marketing of bee products. They were awarded a project contract from the Active Labour Market Programmes Project, which is given by the Turkish Labour Office and the European Union. The goal of this project is to improve production and marketing with increased education and better technology. The desired outcomes include increasing the variety of bee products, purifying honey, increasing honey yield per hive, creating more employment opportunities, establishing a training center, and helping unemployed youth who have graduated from high school (Saner et al., 2008).

## Vermont Case Study

The Intervale Center, a nonprofit organization in Vermont, collaborated with local farmers to help increase farmers' income as well as provide more convenient access for the community to locally grown foods. With these goals in mind, a collaboration was formed called the Intervale Food Hub. The collaborative between The Intervale Center staff and farmers focused on community supported agricultural (CSA) programs as well as wholesales to market and distribute the products. Historically, farmers struggle to meet the high consumer demands, so by

collaborating with other farmers, the demand is more likely to be met (Schneider & Francis, 2005). The Intervale Center began by identifying consumer demands followed by farmer needs. Once the collaboration was formed, both parties worked individually and together to determine a plan including quality, quantity, and pricing of products. The collaboration also involved a sharing of information and expertise between members. Staff members helped beginner farmers establish good business practices while networking among the farmers helped establish good farming practices. To reach a larger audience and create awareness of the agricultural movement through CSA marketing, the Intervale Food Hub also partnered with local businesses to be pick-up locations for the products. Although the collaboration incorporated great techniques, they also faced challenges that had to be addressed. To address the challenge of competition between many farmers and their products, the Food Hub provided resources on individual farms on their website so consumers had as much information as needed for where their products are coming from. The farmers greatly benefited from this form of collaboration. They were able to set the prices for the products they provided based on how much they thought the products were worth, as well as how much cost would be involved in the production. It was also convenient for the farmers to have the staff members coordinating the business and marketing of the products. This relieved the farmers of many of the management responsibilities many do not want to handle. Farmers stated that while participating in the Intervale Food Hub collaboration they noticed an increase in income and greater exposure to new customers (Schmidt et al., 2011).



## Appendix C: Stakeholder Interview Notes

### Ms. Nikolia Avgena and other beekeeper beekeeping hobbyists and professors

- Personal beekeeping information
  - Both of them are professors
  - They have been beekeeping for 10 years
  - They have had as many as 100 hives at a given time
    - 68 hives right now
      - Not a suitable environment last year because of weather and climate
      - Had to combine hives to keep them alive
      - They have not had any issues due to colony collapse
  - Their motivation to start beekeeping came from Ms. Nikolia Avgena's PhD professor
    - They were "Bewitched" by beekeeping
  - They beekeep in a more rural environment on the other side of Thessaloniki
  - How much product do they sell each year?
    - They are able to sell everything they produce
    - Produce 10 kilos from each colony per year
    - 30-40 colonies
  - Most popular products
    - Honey
    - Propolis
    - Pollen is less popular
    - Every year they have a different variety of honey because of different plants year to year
- Educational career
  - Nikolia is getting her PhD at Aristotle University
    - On bee venom/agronomy
  - They teach paid, adult beekeeping classes during the 2nd semester at the American Farm School
    - Students at many different skill levels
      - Some don't know anything about beekeeping/how to beekeep while some want to do it professionally
- Information about the classes they teach
  - Teach skills so students can beekeep professionally
  - Basic skills to more complex skills
    - What is a bee
    - Functions of the hive
    - Teach how the seasons differ
      - Class runs from October to June
      - Teach about how to manage hives during all 4 seasons

- Teach about different products
      - Honey
      - Wax
      - Propolis
      - Royal jelly
    - Teach about the necessary plants for the bees to thrive
    - Provide practical hands on work
      - Classes held at hives on campus
    - Teach about the enemies of bees
      - Diseases
      - How to deal with diseases using both organic and synthetic methods
  - They are capable of training a person who has never seen a bee into becoming a full beekeeper
  - They keep in contact with old students
  - Around 30 to 34 students start the course and about 30 students finish
  - Around 10% of those who finish become beekeepers
  - They have been teaching about beekeeping for 3 years
- Hives at the American Farm School
  - There are 10 to 20 hives on campus
  - Numbers fluctuate because of classes on handling bees and trying to show the different stages of a hive affects the bees
  - Not enough plants in this part of Thessaloniki to be conducive for hives
- General Beekeeping
  - No big difference between rural and urban beekeeping practices
    - Bees have been around longer than us and can survive in both environments
    - Bees have certain tasks they will do every season no matter where they are
    - We take from the bees so we have to give back
      - Give flowers (keep them alive/plant more)
      - Grow gardens
      - Keep nature in balance
  - The bees eat honey in the winter and fly around in spring/summer to keep warm
  - Propolis is used for hive defense and as an antiseptic
    - Intruders who are too large for the bees to remove are covered in propolis to preserve them and prevent disease
- Issues they face as beekeepers
  - Climate is the biggest issue they face
  - When there is not enough food, the bees can get diseases
  - Not many factors can be controlled in beekeeping
    - No matter how well organized beekeepers are, beekeepers don't control the bees
- Government involvement
  - Aid is offered for those who qualify as professionals by having >150 hives
  - No aid is provided for them as hobbyists

- Help with travel expenses
- Beekeepers can declare travel between hives as business expense on tax form
- Special section of government budget is set aside for beekeepers
  - According to the size of production of the beekeeper
- Government help with replacement of up to 10% of hives
- Beekeepers can get insurance on hives
  - Valid for up to two diseases in a year or for flood damages to hives
- Government support they would like for beekeepers
  - Protection in marketing
  - Quality criteria for labeling
  - No labeling fake products as bee products
    - Up until recently only honey was protected
    - Recently protection for royal jelly was added
  - Help promoting unique types of honey from Greece
    - Pine honey
      - Only found on the Turkish coast and in Greece
      - Produced from pine tree parasite
    - Research is done to create products, but the researchers can't properly promote the products produced
  - They do not want much from the government because they said that in Greece when you ask something of the government, they want something in return
- Engagement with community
  - They personally do not engage with the public through many events but go to some festivals
  - Festivals & Exhibitions
    - There is a honey festival in Thessaloniki during the first 15 days of October and similar festivals all over Greece
    - There is a honey exhibition in Athens during December
    - There are also beekeeping exhibitions to promote tools and equipment
    - Food exhibitions happen in Athens and Thessaloniki every year
      - Beekeepers participate in these exhibitions as well
  - Farmers Markets
    - Sell local products
    - Need special license to sell at farmers' markets
- They are not formally working with others outside of teaching classes
  - If they have free time, then they are interested in sharing knowledge with others. They already do so unofficially by giving advice to friends over coffee.
  - They share resources and tools with their friends informally. It is a common thing among beekeepers to share equipment.
- Beekeeper Associations
  - Associations hold presentations and workshops
  - They have given some talks through associations

- More active in some associations over others
- Pan-Hellenic Beekeeping Conference
  - Held every two years
- Are they interested in offering other services beyond products?
  - They beekeep as a hobby, so they are not interested
  - Production is low and therefore income is low
  - They use the money they earn through beekeeping to cover the cost of beekeeping rather than profiting from it
  - To make more of an income, more investment in beekeeping is required
- They are members of an association
  - 450 members in the beekeeping association
  - Contains a mixture of hobbyists and professionals
  - Must pay for membership
  - Professionals offer some events for other professionals
  - Have given small talks once a year at association
- Top 3 pieces of advice to other beekeepers
  - You must love beekeeping
  - You must have the necessary knowledge about beekeeping
  - You have to have good friends who are also beekeepers and are willing to help
  - You need to know how to manage your hives during the different seasons
- Suggestions for new beekeepers
  - They have helped many people become new beekeepers
  - They must first love the practice of beekeeping and then be willing to learn everything about it

## Konstantinos Georgakakis

co-owner of Trofi, a collaborative company

- In Greece, agriculture and tourism are both big industries
- He has been beekeeping for around 10 years
- Beekeeping is a big adventure
- Why is he interested in beekeeping?
  - Started MSE in agriculture
  - It was a way to make his own job
    - No one tells you what to do
    - It's just you, the bees, and the weather
  - Interested in honey because it is different than other agriculture products
    - Does not need to be refrigerated like other produce
  - Came from the city but he met a beekeeper and started working in the mountains (mentorship)
- How he got a beekeeping education
  - Read a lot
  - Seminars
  - Found an experienced beekeeper who mentored him
- Collaborates with 2 other friends and together they have 600 hives
  - Optimistic about what they are doing
  - Took a while to formalize this collaboration
  - In the beginning he collaborated with others to have space on a truck to move his hives
  - Began because they all understood each other and what they needed to do
  - They are officially a company, Trofi
  - Not a part of the Federation of Beekeepers' Associations
  - Started collaborating when he realized one person can't do it on their own
  - Combining allows them to make more product
  - 3 members with separate jobs
    - 1) works in forest, 2) marketing and sales
    - Will rotate jobs/trade off roles depending on the work that needs to be done
    - He handles the business aspects
      - Permits
      - Marketing
    - Other person in charge of developing hives and production
  - Use vertical integration
- Products
  - Only sell honey
  - Produce wax and propolis but they use it for the bees and hives
- Do not meet market demand
  - Production was low the last 3 years
  - Last year they produced 5 tons, hope to produce 12 tons this year

- Sales and Marketing
  - No one has a business background, just knowledge from working in beekeeping
  - Will ask others if they need help
  - Have a marketing expert they will talk to for help
  - Market through a website and word of mouth
  - Sell to small stores, don't have their own store
  - Export to places in Europe including:
    - Denmark
    - Sweden
    - Germany
  - Started exporting by giving 25 kilos to wholesale but now they sell smaller products with updated labels
- Started their own production facility this year
  - They funded it themselves
- Not enough products to participate in festivals yet, maybe next year
- Government help
  - Uses fuel subsidies
  - Uses hive replacement money
  - No money for packaging because they did not meet criteria for the programs
  - Do not fit under any other helpful programs because beekeeping is not always considered agriculture and farming to the government
- Networking and community engagement
  - Every beekeeper has to be in some community
  - Has helped others this year but found only one person was appropriate for the job
    - Others wanted immediate returns but beekeeping is a long term investment
- Wants
  - International exposure
  - Interested in beekeeping marketing classes. These classes should help show that agriculturalists are also business people
  - Want government hive check services
    - Good for any new beekeeper
- Challenges
  - Some beekeepers are reluctant to share knowledge that will help the competition
  - Biggest challenge
    - He is from the city so it was hard to find land for hives in the beginning without the proper connections
  - Every stage of the process is a challenge in the beginning because it is new
    - Where to buy supplies
    - How to package honey
  - Never experienced hive theft until now
    - Convinced it is part of the job and there is nothing that can be done about it
  - Pesticides are an issue

- Not a lot of good quality honey in the market
- Next generation is getting more involved and tend to have an education but established beekeepers' children will usually not have that education

## Argiris Georgakas

member of Honey Georgaka, a large family owned beekeeping business

- Personal and business background
  - Small, family, owned business
  - Started by grandfather in 1948
  - He is the 3rd generation in the business
  - They have 500 hives (a lot for Greek standards but not necessarily for other countries)
    - For Austria 10,000 hives is a lot
  - He grew up in the business
  - He started taking over the business at around 17 to 18 years old.
  - He doesn't go to the hives but handles packaging and marketing instead
    - His mom, dad, and brother work the hives
- Business has large presence in Chalkidiki
  - Two stores in Chalkidiki
  - Majority of the customers are international because the area is touristy
  - Collaborates with other store owners and hotels to sell their bee products
  - Very engaged with the community through festivals in Chalkidiki to promote their products during the summer
- Vertical integration is used in that they beekeep, collect, process, package and sell the honey
- The family is part of a well-organized cooperative
  - Beekeepers individually market and sell products
  - Cost efficient because they share equipment
  - Cooperative has a €30 membership fee (considered just a formality)
- Products
  - They produce and sell a variety of honeys from local flowers and plants
    - One of their products is creamed honey which wasn't available in Greece before 2015
    - Most popular product is pine honey (makes up 60% of honey sold)
      - Pine honey is more popular in the north where customers are used to the taste
      - Pine honey does not crystallize.
  - Pollen may be eaten with a spoon (it is important to try just a little at first to make sure you are not allergic)
  - A lot of other products can be extracted from honey and obtained during processing
    - They take the water from a boiled honey comb, distill and ferment it to sell as alcohol
      - This is a regional product only produced in Chalkidiki
      - The product is European Union protected, meaning that the specific product can only be made in that region
      - 40% alcohol
    - Balm
    - Candles for church made from beeswax



- Honeycombs
- Beekeeping practices
  - Remove wax from honeycomb and boil the honeycomb to protect from illness also to remove dark color that could stain the honey
    - Results in a product (alcohol made from the boiled water) and can reuse the equipment
  - They move their hives every period depending on the weather to get a variety of honey
    - They move during the night when it is dark because bees go in their hives at night
    - They move hives to as far as the Peloponnese area
    - Production can start earlier down south because spring starts earlier
  - There is a large dependency on weather conditions which leads to lots of variance on what type of honey is produced
  - Safer to keep the products, like honey, in the fridge when processing
- The climate in Greece involves long periods of drought, then long periods of rain.
- Bee information
  - A queen lays up to 2,000 eggs per day during the summer and spring
  - Up to 60,000 bees can live in one hive
  - Bees go to the center of the hive in the winter to stay warm and regulate temperature
  - Worker bees live only one month in the summer but can live up to five months in the winter
    - Exhaustion from overworking kills bees in the summer
  - Bees have different jobs depending on their age
  - The job of a male drone is to reproduce and during the winter the drone is considered useless so they are killed
  - The queen flies and gets inseminated by as many males as possible
  - The hexagons in a honeycomb are perfect hexagons
    - Most efficient use of space in a hive
- Marketing and sales
  - Using social media has been really successful for their business
  - They use a mix of modern marketing techniques while incorporating old tradition by using social media but also displaying the old equipment they keep in their store
  - They want customers to come in and see the honey
  - They export a small quantity of honey to Germany
  - The business has been selling through an e-shop the last two years
    - Shipping is too expensive to ship to the US
    - Products may be shipped to:
      - Cyprus
      - France
      - Germany
      - Spain
      - United Kingdom
      - Greece

- Thoughts on agritourism
  - Has potential
  - Requires a lot of investment
  - There are practical issues such as bee allergies
  - They have been considering starting some form of agritourism
- Government involvement
  - Not receiving financial aid from the government
    - Farmers and agriculturalists receive aid for travel expenses
  - Looking for government aid to provide funding to reduce production costs.
  - Does not see a need for the government to get involved with marketing.
    - Does not think the government would help much.
    - Focused more on marketing individual business
- Community involvement
  - Is a part of an association of beekeepers that offers extension services and education
  - Aristotle University offers classes for beekeeping as well as quality assurance education
  - Resources he wishes they had better access to:
    - Local associations
    - University classes/seminars
    - European Union funding
- Advice and knowledge for new beekeepers
  - Need to have a desire/appetite/passion/etc for activity
  - Networking is very important
  - Demand is higher than supply for honey
- Marketing educational resources
  - Google has organized seminars in Thessaloniki for free
  - Facebook and instagram are very helpful tools
- Interest levels in future collaboration
  - He sees no need to collaborate with other producers because they are the leading enterprise in this region.
  - He is willing to share knowledge with others
  - He thinks a mentorship program would be a nice idea but there is a lack of time
  - Interested in collaboration to combine products to export? No
- Ideas for Honey Georgaka for the future:
  - Buy products from other producers and sell under their name
    - Obstacle: ensuring the quality of those products meets standards

## Paschalis Harizanis

Director of the Laboratory of Sericulture and Apiculture at the Agricultural University of Athens and consultant to the Ministry of Agriculture

- Personal background
  - Started beekeeping in 1973 while a student at University of Thessaloniki
  - Worked with a professor from Ohio State who taught him about beekeeping
  - Has 40 to 47 years experience working with bees professionally and academically
  - Has 15 years of experience with commercial beekeeping in northern Greece
  - He teaches a variety of courses related to beekeeping (commercial, biology, etc.)
  - He has spoken at over 200 seminars worldwide, but mostly in Greece
- Beekeeping
  - Beekeeping in Greece is not like it is in Northeast United States, Greek beekeeping is identical to beekeeping in California due to similar climates
  - Summer is the hardest month for beekeeping in Greece
  - Beekeepers collect honey from hives 2 to 3 times per year
    - 13 to 15 kilograms is the average production per colony
  - Professional beekeepers are able to extract 20 to 40 kilos per year because they move the bees across the country
  - Based on his observations, the greatest numbers of professional beekeepers are located around Thessaloniki and Chalkidiki
  - Typical commercial beekeepers have around 150 hives, but up north they have as many as 1,500 hives
  - Most beekeepers use beekeeping as a secondary source of income
  - Some beekeepers sell bees and queen bees to other beekeepers
- Challenges beekeepers face
  - Survival of bees has to do with the environment they are in
  - There are more than enough pollinators in Greece, so pollination is not a concern
  - Need to make sure bees have enough resources
  - Bees are moved five to seven times a year for commercial use
  - In United States
    - More demand for pollination than the bees can provide
    - Bees have plenty of plants to pollinate because there is little competition
  - In Greece
    - The bees can pollinate more plants than are present
    - Bees migrate to ensure they have enough nectar
    - Over one million colonies in Greece
      - This results in a high density of bees compared to the rest of the world
    - No need for pollination management in Greece
    - 15,000 tons of honey is produced in Greece each year

- Advice for new beekeepers
  - Start with two to three colonies
  - Double your number of hives each year as you progress
  - Initial cost of \$400 to \$500 to start with two to three hives
    - This means, if you quit, you do not lose a big investment
  - Take a class or learn beekeeping from seminars
  - Read books
    - His book is good
  - Avoid online resources because there are too many and it is confusing
    - There are over 300 beekeeping blogs in Greece
    - There are many misleading sources of information
  - Do not be a beekeeper if you're allergic
    - Out of 400 to 500 students about 4 to 5 must drop the class due to allergies
  - Do not attempt to market your products in Athens or Thessaloniki because those markets are already saturated
- Challenges for beekeepers in Greece
  - There is a lot of competition
    - 1,000 beekeepers and 6,000 colonies in Athens
  - Colony theft is a problem, especially in northern Greece
  - The greatest challenges from most challenging to least challenging are:
    - Weather
    - Disease and pest such as varroa mites
    - Pesticides
      - Beekeepers avoid moving bees around certain cultivation areas due to pesticides
    - Bad hive management by beekeepers
- He is not part of any beekeeping associations, but he is a part of professional societies such as:
  - Apitherapy society of America
  - Entomology society of America
  - Entomology society of Greece
  - A sericulture association
- Informal methods of collaboration
  - Beekeeping seminars around Greece
  - Databases on website with all registered beekeepers
    - He maintains a website with a group that provides information to all Greek beekeepers. All Greek beekeepers stay connected
- Government interest in beekeeping
  - Government gives 8.5 million euros per year for beekeeping
    - Half of the money is provided from the Greek government
    - Half of the money is provided from the European Union
    - The government has been providing these funds for the past 19 years

- Beekeepers get help from laboratories through the Ministry of Agriculture
- Laws and policies
  - The government provides protection against pesticides
  - Set of laws similar to European Union laws; any Greek laws must be in accordance with European Union ones
  - Policies on how to collect, pack, label, and distribute products
  - melinet.gr is a good source of information on beekeeping in Greece
  - Beekeepers can reach out to the government through the Beekeepers' Union
    - Union is able to suggest new policies motivated by beekeepers
    - Not all have been successful
  - Often times Greek beekeepers are unhappy with the laws from the European Union as some member countries do not care about beekeeping (especially up north where it is too cold), so laws are based on imports rather than being beekeeper friendly
  - Beekeeping is important in Greece, Italy, France, Spain, Portugal (South)
  - Government is open to making new laws and policies
  - Government is open to providing resources and money as they already do
    - An example of aid is helping bees during the winter by providing food and planting bee friendly flowers
  - Beekeepers often ask for more than the government can provide
  - There should be control of quality marketing and products but some beekeepers do not like it and may try to get around it
- Government marketing information
  - A lot of the distribution is by beekeepers themselves who need to follow government regulations
  - Beekeepers selling honey commercially must also follow rules and regulations

## Honey Sithon

largest beekeeping cooperative in Greece based on number of hives

- Beekeeping and honey information
  - Center for Greek apiculture in Chalkidiki
  - Nikiti is apiculture city in Chalkidiki
  - 40,000 bee workers in one hive (infertile females)
  - Each hive has 10 honeycombs and one queen
  - Famous ice age in Europe but Greece was not covered in ice
    - 67% of all plant species in Europe can be found in Greece
    - More than 6,000 plants in Greece with greater than 1,000 unique to Greece
    - This plant diversity increases the quality of the honey in Greece
  - Pine honey is only found in Greece and Turkey
    - Less calories
    - Comes from the secretions of an insect, not a flower
  - Beekeepers will move their hives 4 times a year
    - Beekeepers do not have to own the land they are moving to, sometimes they have to pay
    - Give landowners part of the product
    - Many beekeepers put their hives in olive groves
      - The olive grove does not need the bees for pollination => no benefit for plants
      - From spring to October the beekeepers clean the olive groves to be able to put their hives there. When the olive producers come back, the field is clean and ready for harvest
  - Necessary beekeeping investments
    - 150 to 200 euros per hive
    - Truck to move hives
- Honey Sithon history
  - Cooperative started in 1952 with 50 members
  - Tradition of beekeeping in Nikiti
  - Every house in the city had a beehive
  - Previously the members sold individually but that was difficult
  - Once they joined/started the cooperative, they sold collectively
  - Larger beekeepers were making more product than they could sell, but they could reach a larger market as a cooperative
  - In 1986 they got funding from the Greek government to build the factory
  - First began selling retail then reached their peak production in 2000
    - 148 beekeepers
    - 1200 tons of honey
  - Now 47 beekeepers and 500 tons of honey
- Other cooperatives have more members but Honey Sithon has the most hives
  - 47 members who are beekeepers

- Each beekeeper has 600 to about 1,000 hives
- All beekeepers are professionals
- Not restricted to just Chalkidiki, move their hives all over Greece
- Other information about Honey Sithon and their practices
  - Honey harvesting is done by beekeeper
  - 1,050 tons of honey produced yearly
  - Partner with scientists to ensure quality of honey
  - Beekeepers are trained by the cooperative to help ensure quality
  - Modern production line for processing and packaging
  - Goals are known to the public
    - Global market
    - Provides beekeepers technical support
    - Create honeycombs created from the beeswax; provided to the beekeepers in the cooperative
  - They have received awards for their honey
  - Check out magazine article: Estitor
  - Quality of honey is different; some are more or less commercial grade
    - Sell for credit
  - All employees are family members of producers
- Membership
  - Members are from north central Greece, only two members not from Chalkidiki
  - Pay 9,500 euros in order to be a part of the cooperative, they are buying a share of the cooperative
  - This leads to same size share for everyone but can create conflict because it is a democratic system. This is why members must all have at least 150 hives (be professionals)
  - Contract farming with 30 producers outside the cooperative in addition to the 47 members
    - Producer is guaranteed a set price for a product
    - Cooperative is guaranteed a set amount of production
  - Reasons for decline in membership
    - Decrease in membership due to wholesalers offering better deals to producers
    - Demographics: younger generation is less interested in agricultural jobs
      - Because of recession, people are returning to agriculture and beekeeping (it skipped a generation)
    - Beekeepers are often over 70 years old or around 30 years old
  - In the past the beekeepers could only sell in the cooperative, now they have the right to sell themselves as well
    - They give whatever product remains from selling alone to the cooperative
    - Difficult to sell all their product on their own
- How do they encourage collaboration?
  - Beekeepers are all from same area

- They are friends
- Meet often at meetings
- Social ties
- No competition between the beekeepers in the cooperative
- They are a community
- They travel together
- During April and May the beekeepers need to do a lot of work so they live in their trucks together like nomads
- Benefits
  - Free technical support to members
  - Why should beekeepers be members?
    - Members get better prices for their honey
    - Will buy all quality levels from members
      - Sunflower honey is considered low quality because it crystalizes quickly
      - Used for baking in hotels
    - In order to protect producers, they track market prices
- Marketing and Sales
  - Honey is doing really well and the cooperative is very successful
  - High demand for honey leads to high competition in the domestic market
  - Sell to wholesale companies for sale throughout Greece and Europe
  - Approved for international sales
  - Sell all over the world but in small amounts
  - Export 10% to China, United States
  - Biggest customer is Sweden
  - Attiki buys honey from Sithon to sell
    - Buy in bulk up to 300 tons
    - Sell under their own name
  - They have 5 stores
  - They sell only certain types of honey in grocery stores but have a larger variety in their own stores
  - Use social media, magazine ads, and radio ads
    - Used to use TV ads but is now too expensive
  - What has been successful
    - Giving out pamphlets
    - Opening stores
    - Being a cooperative is a good selling point
    - Name of the cooperative is a good selling point/very important
  - Director of Cooperative makes decisions with 5-member managing council
    - Managing council is made of beekeepers
    - Director has a business management background
  - President has been president for past 25 years so they are very knowledgeable from experience



- There are 29 employees including their retail workers
  - 2 accountants
  - 18 factory workers
- Community engagement
  - Every year they hold seminar trainings free of charge and open to the public
    - Trainings for testing for diseases
  - Host events in the summer for tourists with tastings and tours at the facility
- Government support
  - 4 to 5 euros per hive for travel expenses
  - Financial support to buy hives
  - Funding help for technical analysis and processing of honey
  - 50% from European Union and 50% from Greek government
  - All aid is just for professionals
  - Standard across all of the European Union
  - European Union supports this because they want diversity in Europe
- Wants and Challenges
  - Less taxes
  - Funding to replace equipment
  - European Union and state support, not commercial support
  - Want better quality control regulation from the government (from honey mixers)
  - Lack of export experience
  - Cost of production is high in Greece
    - 4 euro cost of production in Greece
    - There is competition from China and Mexico because prices are competitive
    - 1 euro cost of production in those other countries (for C grade honey)
  - Different quality grades
    - C grade is considered low, high water content, not very pure
    - Problem of C grade honey being mixed with Greek honey and marketed as Greek honey
    - Only select hotels use Greek honey (only the really nice ones)
  - Hive theft is a problem
  - Expensive to participate in exhibitions but they do participate
  - If there is more honey then they can export more
  - Production is the greatest challenge; last year it was a problem due to weather
    - Largest challenge is production and meeting the demand
    - Trends due to climate change resulted in a decrease in production the past several years
    - What makes weather bad is complicated

## Nea Kalikratia Beekeeper

### large individual beekeeper

- His beekeeping background
  - Beekeeping for 20 to 25 years, close to 30 years
  - Makes a living from beekeeping
  - Very demanding job but profits are good
  - He is considered a big producer and has 500 hives
    - Hives have up to three stories/layers
    - 500 hives is the limit for a single person to sustain
      - Cannot afford to hire other employees at that rate of production
      - Cannot maintain any more hives than that on his own
  - Sells out of one store in Nea Kalikratia
  - Motivation for beekeeping:
    - Enjoys job
    - Promising income
  - He has no business training, only beekeeping training
- Products he sells:
  - Olive oil
  - Different types of honey
  - Pollen
  - Wax
    - Makes candles at small business to sell
- Able to meet demand?
  - Quarter of production is sold at store
  - Rest is sold to wholesalers
  - Last year was a bad year because it was rainy
    - Produced 7,000 to 8,000 kilograms
  - During a good year he may produce 15,000 to 20,000 kilograms
- Does he export?
  - No
  - The wholesalers that he sells to then export his products
- Travels from the Peloponnese area to Thassos
  - He goes south in the winter
  - Beekeepers move to certain locations depending on the honey they want
  - From April to October/November he leaves for 20 to 25 days at a time; comes back home for about a week in between
  - People who own land help him
    - Some ask for money
    - He typically just gives honey because pollination is good for their crops
    - Long term relationships with farmers in Greece
      - Networking

- Relationship with landowners allows him to just call them up if there is an issue
- Advertises through word of mouth
  - 90% of customers are returners; has customer loyalty
  - Other 10% do not return
  - Does not use social media
- Engages with public?
  - At festivals and events during summer
  - Has limited time and so he is unable to participate in many events. These events are often during the time of year where he is very busy
- Government aid
  - Not receiving any, not even for travel
  - Difficult to obtain if not in a cooperative
  - Wishes there were tax breaks on gas to reduce the cost of travel
  - Wants consumer prices to be more fair because there are high mark ups (€3 to €10)
  - Uses some funding
- Clubs or organizations?
  - Informal networking
    - Share info when traveling
    - Share extra space in truck
    - If one person is lacking in honey supply, they share
- He has participated in a seminar
- Used to be a part of a cooperative but left because:
  - He had to buy supplies for them that were expensive and he did not always need
  - Payments for products would come in months later which causes issues with paying for expensive things like travel
  - Wants max of 2 months delay for payment after delivery; needs money for travel
- Interested in combining resources to be able to export?
  - Shares resources on the production level already
  - It is a sort of community
  - Not interested in combining products formally
- Interested in helping new beekeepers?
  - “Yes. Why not?”
- He is willing to mentor
- Future plans
  - Is getting old and plans to halve his number of hives over next three years to 250 hives
    - Because wholesale isn’t as profitable
    - Wants to spend more time in his store
    - 250 hives may seem little but is still very demanding
  - Current business is profitable enough for him
  - Occasionally hires someone to work in the store for him over the summer
    - Sometimes his daughters work in the store

- Beekeeping challenges and issues
  - Biggest challenges:
    - Climate change
    - Driving around to find spots for hives
      - Dependent on what flowers are present
    - Lots of planning
    - Sometimes has to hire people in order to be at the right place at the right time to place hives
  - Hive theft, mites, and pesticides are issues
  - Believes quality control is an issue but not much can be done about it
    - On his end he makes sure he produces quality products and his customers are loyal and come back
    - Good quality honey stays liquid
- Desired aid
  - Another person working with him to help
- Queen lives for 3 years at max productivity
- Male bees are lazy

## George Menzelos

### United States importer from Arianna Trading Company

- He has been importing Greek products to the United States for 10 years
  - Private label (Arianna Trading Company)
  - His stores sell natural products
- He believes that Greek honey is fantastic and would love Greek honey to go to the United States but is scared to try this due to the following challenges
  - High prices for Greek honey is the problem
    - Standard markup is usually 3 times the purchase price
      - Buy something for \$10→ retail price is \$30
        - Too high of a price to sell in United States
        - Only some customers willing to pay that much
  - Greek honey has not gotten press in the United States
    - No one knows that it is that good
    - Maybe if you could show people its health benefits (medicinal properties)
    - Hard to sell
      - Helpful to have people taste it before
  - 50% of people want honey from their neighborhood (local honey)
  - Americans lack the educational aspect of honey
    - Honey crystallizes if cold or old
    - If honey solidifies, Americans may think there is something wrong with it
- Certification needs to be okay in Greece first
  - Involving labeling
  - Food and Drug Administration (FDA) is old school and does not keep a very good eye on stuff
    - Official documents must be sent through fax and sometimes they are not even aware if their fax machine has no paper
- He knows a friend that invested 3,000 euros on a honey farm on a Greek island
- Alexandros (his successful friend)
  - Lives in Greece
  - Produces unusual honey
  - Produces pine honey
  - Is a beekeeper and does trainings in beekeeping
- Honey is adulterated
  - People heat it in order to keep it liquid
  - Cheaper from China and Korea
  - Mixed honey is used in industry (we don't even know if it is even honey)
- Oprah thinks Greek honey is the best honey
  - Specifically Thyme honey
- Propolis ruins your taste for 24 hours

## Konstantinos Tertivanidis

Governmental official, Director at the Regional Development Fund of Central Macedonia, former Director at the Directory of Rural Development & Fishery for the Region of Central Macedonia

- He is responsible for allocating funds for big state projects
  - Specifically projects to support sustainable development
- Honey and Beekeeping Information
  - One third of honey production is in Central Macedonia/Northern Greece
  - 200 hives needed to have sufficient income to live in Greece
  - Many producers sell direct to customers like the black market
  - Honey is part of the culture and all households have honey
  - Companies have been trying to replace sugar with honey
  - Nutritional trend is to eat high nutrition foods and not just light foods (focus on nutritional value not just calorie count)
  - Agriculture is important to European Union and region of Macedonia
    - In general, European Union is not very competitive compared to other places like China and Brazil
    - European Union and other close states fund agriculturalists to help make them more competitive (reduce business costs to be able to price more competitively)
    - Lots of importing can lead to unemployment and dependence on other places
      - Do not want to be dependent on other countries for food because if they stop exporting there is an issue
- The government collaborates closely with regions in Europe
- Beekeeping is a priority for the government because it is an important economic activity and the following reasons
  - Low land and water use (environmentally friendly)
  - Part of the culture for years
  - Product that can be exported
- Every state has their own rural development program to help farmers with production
- Government initiatives
  - Two forms of subsidies
    - Direct: based on amount of production
    - Indirect: based on eligibility requirements for starting/developing a business
      - Basic criteria
        - Propose something related to their interests/ high priorities
          - Low water use
          - Honey
        - Need to be under 40
        - Better educated people receive more points towards their ranking

- At their level they have regional events to showcase honey and olive oil and local products
  - Go to international food festivals such as Fancy Food in New York
  - They try to promote products through cuisine (Macedonian Cuisine)
    - Have to apply and be accepted to the initiative
    - Ex. mozzarella is known through Italian cuisine
- Many initiatives mostly in promotion are through subsidies
- Through rural development funds, the state funds small businesses for five years
  - Year 1: 10% of income is paid to the state
  - Year 2: 8% of income is paid to the state
  - Year 3: 6% of income is paid to the state
  - Year 4: 4% of income is paid to the state
  - Year 5: 2% of income is paid to the state
  - This money is paid in exchange for participation to pay off the costs
- How to get involved in such initiatives
  - Producers must meet certain criteria
  - Producers ranked based on criteria and the top of the list are accepted
  - Invite through public conferences and public invitations
  - Local producers may also learn of the initiatives from local agronomists
- Hive theft is an issue as well as bears
  - Each beekeeper has unique ID number to identify their hives
    - Branded into every hive
    - For many years, people respected the stamps but in the last few years there has been an increase in theft
  - No specific set of policies regarding hive theft; just reported and dealt with as common theft
  - State funds electric fences around hives to keep bears away
- Honey labelling criteria
  - Place(s) of origin must be on label with the corresponding percentage of each honey present
  - There is a problem with mixing in substances such as sucrose but there are no labeling requirements regarding this
  - Do an analysis of pollen in honey to identify where it came from
  - Honey is considered a natural product so as soon as it is processed it is considered artificial
- Pesticides and hive placement
  - Pesticides are labeled if they are harmful for bees
  - If using pesticides, you must use them at night when bees are not out so as not to harm them
  - European Union banned some pesticides that are harmful to bees from the market
  - Hives are not allowed near playgrounds or hospitals
- Educational and other resources

- State finances educational programs at vocational schools and the like
  - Training on beekeeping and the products
  - Have helped with youth unemployment
    - Trainings at universities
    - Beekeeping is a way to supplement your income
  - There are no educational programs specifically for business that they finance, only funded by private classes
- How are resources made available to beekeepers
  - Website: [www.pkm.gov.gr](http://www.pkm.gov.gr)
  - Can ask advice from cooperatives and other informed people
  - Can get info from events
- Open to listen to opinions of beekeepers
  - Not much lobbying in Greece
    - Cooperatives are not as strong/well implemented as elsewhere
    - Part of the culture to not collaborate
  - Beekeepers give input and they provide events or funds in response
  - Beekeepers reach out to the government through local agencies or cooperatives/businesses with enough power to directly reach out to the government
  - Ex: New Farmers is a program for agriculturalists
    - Beekeepers were not initially included through the Greek State's program
    - Regional government made it available to beekeepers
  - Hard for individuals to approach the government, lots of little requests will get lost



## Appendix D: Interview Analysis Matrices

### Original Matrix

Interviewee	Practices (Used & Existing)	Wants/Needs/Interests	Challenges to Solutions and/or Beekeepers
Nikolia Avgena; hobbyists and beekeeping educators	beekeeping associations	govt help with marketing	Diseases
	festivals & farmers markets	quality assurance	lack of plants in some areas
	word of mouth marketing		Climate
	govt help to professionals in the forms of insurance, hive replacement, & travel expenses		don't want govt aid
	In contact with old students		Time
	Paid beekeeping courses at AFS		
	sell varied products		
	bi-annual PanHellenic beekeeping conference		
	legal to sell honey from home		
	share equipment with friends		
	seminars (talked at some)		
Nea Kalikratia; large individual beekeeper	informal networking and sharing	travel help - reduced gas prices	buying supplies for cooperative can be costly
	sells part at store and part to wholesalers	fair consumer prices/ reduce mark ups	Can't maintain any more hives on his own
	relationships with landowners	spend more time in his store	does not want to combine products formally
	word of mouth advertising	Mentorship program	climate change
	Festivals	another employee	finding locations for hives
	uses some form of funding		hiring people (financials)
	Sells variety of products		late payments from coop
	help from temps or family		no business background
	Moves hives		Access to govt. resources
			wholesale not profitable
			hive theft
			mites
			pesticides
		quality control	

Interviewee	Practices (Used & Existing)	Wants/Needs/Interests	Challenges to Solutions and/or Beekeepers
Argiris Georgaka from Honey Georgaka; large business that produces and distributes	Vertical integration	considering agritourism	time
	Diverse products with little waste	funding for production equipment	allergies
	Give products to other stores and hotels to sell	interested in buying and selling others products	reliability of product volume
	Utilize people with different skill backgrounds	interested in mentoring if had time	doesn't think govt can help with marketing
	Eshop & social media (some international sales)		does not want to collaborate to sell/market
	Export to Germany		climate
	Festivals		quality assurance
	move hives		shipping costs
	travel expense aid		
	share equipment		
	Agricultural association offers extension services		
	Aristotle University and Google seminars		
	Visuals: old and new aesthetics, honey		
Dr. Harizanis; Academic with government knowledge	sell bees to other beekeepers	quality control	food for the bees (competition over food)
	education through books		Seasons/ weather
	govt beekeeper registration & accompanying database		misinformation from some sources
	collaborate w/ labs through Ministry of Agriculture		a lot of competition, especially in cities
	Govt. provided funding		colony theft
	beekeeping seminars		disease
	govt protection against pesticides		pests
	labeling regulations		pesticides
	beekeepers union		bad hive management
	govt plants bee friendly flowers		beekeepers unhappy with many laws
	Ag. Professional societies		
	online resources		
	move hives		
govt helps provide food to bees during winter			

Interviewee	Practices (Used & Existing)	Wants/Needs/Interests	Challenges to Solutions and/or Beekeepers
Konstantinos Georgakakis; part of collaborative company	Was mentored	hive checks from govt	finding land for hives
	travel & hive replacement funds	beekeeping marketing classes	varying production/not meeting demand
	collaborated to move hives	international exposure	starting off when new
	market through word of mouth		not enough product for festivals
	In a company with two others		not much good honey in market
	vertical integration		some beekeepers reluctant to share their knowledge
	talks to others for help		long term investment
	exports to Europe		hive theft
	sell to small stores		pesticides
	market through website		Don't qualify for some benefits
	Different roles in company		
	have own production facility		
	Utilizes market expert		
	reading and seminars		
Konstantinos Tertivanidis; governmental official, Director at the Regional Development Fund of Central Macedonia, former Director at the Directory of Rural Development & Fishery for the Region of Central Macedonia	govt works with EU countries		hive theft
	every state has Rural Development program		bears
	indirect and direct subsidies		mixing sucrose
	regional events show products		
	state funds small businesses for 5 years		
	producers sell direct to customer		
	state funds electric fences around hives		
	unique IDs to identify hives and protect against theft		
	origin labelling requirement		
	label pesticides harmful for bees		
	EU banned some pesticides		
	times when pesticides can be applied		
	finance educational programs for beekeeping only		
	private funded business classes		
website			

<b>Interviewee</b>	<b>Practices (Used &amp; Existing)</b>	<b>Wants/Needs/Interests</b>	<b>Challenges to Solutions and/or Beekeepers</b>
Honey Sithon; large cooperative	restricted membership to professionals	less taxes	cost to buy share of coop
	collaboration with land owners to move hives	funding to replace equipment	investment costs in hives
	use science to ensure quality	more govt support, not commercial	selling individually
	train beekeepers to ensure good quality	better quality control regulation	membership decline - lack of interest in ag jobs
	sell to wholesalers throughout Greece and Europe		high competition market
	provide members free technical support		production/ meeting demand (exports too)
	reuse the materials to create products for beekeepers such as honeycombs		weather
	used Greek funding to build factory		lack of export experience
	can sell individually and through cooperative		cost of production is high in Greece
	contract farming		competition with C grade producers
	free seminar trainings open to public		hive theft
	tourist events in summer		
	community of beekeepers traveling together		
	use govt support for travelling and buying hives		
	members get better prices for honey		
	only sell certain products in grocery stores, need to go to their stores for the rest		
	social media, magazine ads, radio ads		
	limited use of different backgrounds		
	exhibitions		

## Simplified Matrix

Interviewee	Practices (Used and Existing)	Wants/Needs/Interests	Challenges to Solutions
Honey Georgaka; large business that produces and distributes	Digital Marketing	Agritourism	time
	Government Funding	Funding	allergies
	Sell to Businesses (hotels and restaurants)	Meet market demand	does not want to collaborate to sell/market
	Utilize other experts (sales)	Mentoring	climate
	Exports (Germany)	Reduced business costs (shipping)	shipping costs
	Festivals	Quality Control	
	Move hives		
	Share equipment		
	Educational Seminars		
	Agricultural associations		
Harizanis; academic with government knowledge	Sell to Businesses (other beekeepers)	Quality Control	climate
	Government Funding	More reliable information	high competition, especially in cities
	Move hives	Greater plant diversity/presence	disease
	Agricultural associations	Protection against colony theft	pests
	Bee Friendly Environmental Planning	Better training	beekeepers unhappy with many laws
	Government Policies (Beekeeper registration, Pesticide Protection, Labeling regulation, Provide support over winter)	Reduce pesticides	
	Educational Seminars		
	Beekeepers Union		
	Utilize other experts (Scientists, Ministry of Agriculture)		
	Online Resources		

<b>Interviewee</b>	<b>Practices (Used and Existing)</b>	<b>Wants/Needs/Interests</b>	<b>Challenges to Solutions</b>
Avgenas; hobbyists and beekeeping educators	Beekeeping classes	Govt help with marketing	diseases
	Networking	Quality Control	climate
	Government funding (insurance, hive replacement, travel)	Greater plant diversity/presence	don't want govt aid
	Festivals		time
	Beekeeping associations		
	Seminars		
	Share equipment		
Honey Sithon; large cooperative	Digital Marketing	Reduced taxes	investment costs in hives
	Government Funding	Funding (equipment)	lack of interest in agricultural jobs
	Selling to Businesses (hotels, restaurants, grocery store, wholesale)	Quality Control	climate
	Utilize business experts	Reduced business costs (production)	
	Utilize other experts (scientists)	Protection against hive theft	
	Move hives (land owners and other beekeepers)	Get expert help (exporting)	
	Share equipment	Meet market demand	
	Educational seminars	Reduce difficulty associated with selling individually	
	Exports		
	Contract farming		
	Agritourism		
	Festivals (exhibitions)		
	Member training and support (technical support and good quality)		
	Konstantinos Tertivanidis, government official	Government funding	Hive theft protection
Government policies		Quality control	

Interviewee	Practices (Used and Existing)	Wants/Needs/Interests	Challenges to Solutions
Nea Kalikratia beekeeper; large individual beekeeper	Funding	Reduce taxes	Low wholesale prices
	Selling to businesses (wholesale)	Fair consumer prices	Mites
	Moves hives (relationship with landowners)	Mentorship	Does not want to combine products formally
	Festivals	Reduce difficulty associated with selling individually	Climate
	Networking	Protection against hive theft	
		Reduce pesticides	
		Quality control	
		Better accessibility to government resources	
		More efficient cooperative model (payments, buying equipment)	
		Business education	
	Hive land locator		
Kostas Georgakakis; part of collaborative company	Collaborative company	Hive checks	Some beekeepers reluctant to share their knowledge
	Mentoring	Business education (marketing training)	Long term investment
	Move hives	International exposure	
	Government funding (hive replacement and travel)	Hive land locator	
	Utilizing other experts (marketing)	Meet market demand	
	Educational seminars	Better training	
	Networking	Better accessibility to government resources	
	Exports	Hive theft protection	
	Sell to businesses (small stores)	Reduce pesticides	
	Digital marketing		

## Appendix E: Questionnaire Responses

### Honey Sithon

**Suggestion: The government may provide an easy to use online portal for funding requests that guides an applicant through the process.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
5
2. Why?  
*Ideal but difficult to place in Greece.*
3. Do you have any concerns about this suggestion? If so, what are they?  
*The services are not electronically linked and there are also no up-to-date electronic registers.*

**Suggestion: It could be beneficial to make more resources available to a greater variety of beekeepers with different backgrounds.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
8
2. Why?  
*Professional beekeepers have greater needs.*
3. Do you have any concerns about this suggestion? If so, what are they?  
*While large beekeepers have more needs, small ones have to be subsidized to raise their capital.*

**Suggestion: The government could maintain a website listing reliable educational resources and seminars. It could create a database of landowners who are willing to host hives for travelling beekeepers or a database of regions to avoid due to pesticide use.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
7
2. Why?  
*Useful for beekeepers*



3. Do you have any concerns about this suggestion? If so, what are they?  
*One can host hives on his estate but neighboring owners sprinkle. Bees can not be restricted.*

**Suggestion: The government could sponsor its own seminars and classes on beekeeping and business skills.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
9
2. Why?  
*Old beekeepers need lessons for new scientific facts.*
3. Do you have any concerns about this suggestion? If so, what are they?  
*Training should be done when beekeepers do not have a special job in the beehives. Ideal autumn late autumn season, winter*

**Suggestion: The government can provide hive checks where they check for mites and pests in order to prevent the spreading of diseases.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
2
2. Why?  
*Difficult to realize.*
3. Do you have any concerns about this suggestion? If so, what are they?  
*Beekeepers are constantly moving and it is difficult to control all beekeepers. It can only be done on islands that have static beekeepers.*

**Suggestion: This service could be provided through the government or some other independent organization. The extension could provide resources and training on beekeeping practices, how to export and market products, and how to best utilize government resources. An extension could also offer a mentorship program to help new beekeepers gain first-hand experience from a knowledgeable source of information. Enrollment fees may help offset the costs.**

**An agricultural extension provides one organized place for educational resources to be offered.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

7

2. Why?

*Useful but far away from someone's home.*

3. Do you have any concerns about this suggestion? If so, what are they?

*It should be subsidized as new beekeepers are deprived of capital.*

**Suggestion: The government can impose more severe punishments on mislabeled honey in hopes of dissuading the practice. The government may increase the enforcement of honey quality and labeling laws by increasing the frequency of honey testing. One strategy would be to create a method for reporting suspected infringements.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

10

2. Why?

*Counterfeiting and illegal gremlins are one of the biggest problems.*

3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: Stricter penalties for thieves and including hive theft in the hive insurance package could help reduce hive theft.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

10

2. Why?

*Another big problem that requires a solution.*

3. Do you have any concerns about this suggestion? If so, what are they?

*Microchip placement subsidies on hives would be more helpful in reducing thefts in relation to insurance coverage of theft.*

**Suggestion: Policies could be implemented that encourage a greater presence of plants in areas that are lacking. This may be done through incentives or imposing requirements. Policies that prohibit pesticides can protect bees and make more land safe for beekeepers moving their hives.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
8
2. Why?
3. Do you have any concerns about this suggestion? If so, what are they?  
*Policies that prohibit pesticides would find contractors against them.*

**Suggestion: More tax breaks for beekeepers can help them reduce production costs.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
10
2. Why?
3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: Laws that establish a maximum product markup from producer to customer could protect consumers from unreasonably high prices and beekeepers from being paid too little from businesses.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
8
2. Why?  
*How will businesses survive?*
3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: Beekeepers can provide some of their products in return for a consultation with a business expert to learn how to improve their business and marketing practices. These types of collaborative relationships can be negotiated based on individual wants in order to provide benefits for both parties involved.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
7
2. Why?

*Marketing is necessary.*

3. Do you have any concerns about this suggestion? If so, what are they?

*Typically, the provision of know-how is costly enough and can not be easily compensated by products*

**Suggestion: Sharing the benefits and costs associated with participating in cooperatives, as well as the possibilities regarding other methods of collaborative selling could encourage beekeepers to collaborate. This would help them meet market demand and reduce business costs. Cooperatives may not be the right solution for all beekeepers, but expanding membership may require adaptations to the traditional cooperative model to provide better experiences and respect the rights of a range of members.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

*10*

2. Why?

*Incentives to encourage co-operatives (reduced taxation, subsidies, etc.)*

3. Do you have any concerns about this suggestion? If so, what are they?

## Konstantinos Tertivanidis

**Suggestion: The government may provide an easy to use online portal for funding requests that guides an applicant through the process.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

8

2. Why?

*It is easy and fast.*

3. Do you have any concerns about this suggestion? If so, what are they?

*The limited use of electronic applications by farmers*

**Suggestion: It could be beneficial to make more resources available to a greater variety of beekeepers with different backgrounds.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

10

2. Why?:

*It is especially important at the beginning of beekeeping by young farmers*

3. Do you have any concerns about this suggestion? If so, what are they?

*They must be viable businesses and not be based on subsidies*

**Suggestion: The government could maintain a website listing reliable educational resources and seminars. It could create a database of landowners who are willing to host hives for travelling beekeepers or a database of regions to avoid due to pesticide use.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

10

2. Why?

*Excellent idea because it covers the needs of beekeepers and farmers. I will suggest it to my service*

3. Do you have any concerns about this suggestion? If so, what are they?

*No*

**Suggestion: The government could sponsor its own seminars and classes on beekeeping and business skills.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
*10*
2. Why?  
*Education and lifelong learning are important for both new beekeepers and the old ones to produce quality honey and the proper hive management*
3. Do you have any concerns about this suggestion? If so, what are they?  
*No*

**Suggestion: The government can provide hive checks where they check for mites and pests in order to prevent the spreading of diseases.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
*10*
2. Why?  
*To limit the spread of diseases*
3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: This service could be provided through the government or some other independent organization. The extension could provide resources and training on beekeeping practices, how to export and market products, and how to best utilize government resources. An extension could also offer a mentorship program to help new beekeepers gain first-hand experience from a knowledgeable source of information. Enrollment fees may help offset the costs.**

**An agricultural extension provides one organized place for educational resources to be offered.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
*10*
2. Why?  
*This will increase the revenue of producers because they will earn the surplus value of their products*

3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: The government can impose more severe punishments on mislabeled honey in hopes of dissuading the practice. The government may increase the enforcement of honey quality and labeling laws by increasing the frequency of honey testing. One strategy would be to create a method for reporting suspected infringements.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

*10*

2. Why?

*It protects both consumers and beekeepers*

3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: Stricter penalties for thieves and including hive theft in the hive insurance package could help reduce hive theft.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

*8*

2. Why?

*Protects producers*

3. Do you have any concerns about this suggestion? If so, what are they?

*Difficult to police because the hives are scattered everywhere in non-residential areas*

**Suggestion: Policies could be implemented that encourage a greater presence of plants in areas that are lacking. This may be done through incentives or imposing requirements. Policies that prohibit pesticides can protect bees and make more land safe for beekeepers moving their hives.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

*10*

2. Why?

*Plantings of beekeeping plants can be made*

3. Do you have any concerns about this suggestion? If so, what are they?

**\*With the following suggestion, it was originally mis-translated to say more taxes instead of more tax breaks. Due to this, this question was disregarded for this questionnaire response.\***

**Suggestion: More tax breaks for beekeepers can help them reduce production costs.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

*1*

2. Why?

*Taxation is already high*

3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: Laws that establish a maximum product markup from producer to customer could protect consumers from unreasonably high prices and beekeepers from being paid too little from businesses.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

*1*

2. Why?

3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: Beekeepers can provide some of their products in return for a consultation with a business expert to learn how to improve their business and marketing practices. These types of collaborative relationships can be negotiated based on individual wants in order to provide benefits for both parties involved.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?

*10*

2. Why?

*Does not require funds from the producer is win to win*

3. Do you have any concerns about this suggestion? If so, what are they?

**Suggestion: Sharing the benefits and costs associated with participating in cooperatives, as well as the possibilities regarding other methods of collaborative selling could encourage beekeepers to collaborate. This would help them meet market demand and reduce business**



**costs. Cooperatives may not be the right solution for all beekeepers, but expanding membership may require adaptations to the traditional cooperative model to provide better experiences and respect the rights of a range of members.**

1. On a scale from 1 to 10, how much do you think beekeepers would benefit from this suggestion?  
*10*
2. Why?
3. Do you have any concerns about this suggestion? If so, what are they?