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A new device to detect the adulterated honey: Business plan

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Introduction

The importance of honey authenticity is becoming more relevant today due the adulteration of this product in the world market; affecting not only exporters but also beekeepers. Mexico is one of the leading honey exporters, with Yucatán being the largest producer, according to Baena-Díaz et al. (2022). More than 50% of total honey production is exported to countries such as Germany, USA, UK, Switzerland and Netherlands, generating revenues of more than \$2.25 million in 2024. The main objective of this research is to create a business plan with its benefits and advantages in a business environment. We are presenting the structure of a business plan that evaluates the market potential and advantages of this product. Honey adulteration has increased from 14% to 35% between 2019 and 2021, in México. Global trends suggest it could reach 60% (Figure 1), also reported by scientists and businesses. This is why a product is needed that quickly identifies adulterated honey; in our institute it has been designed and constructed a device to detect adulterated honey.

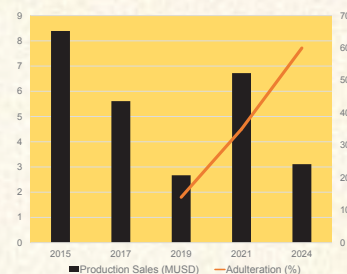
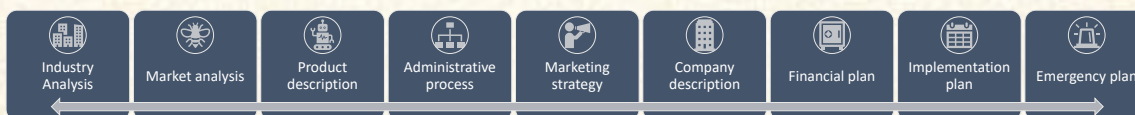


Fig. 1. Production and adulteration in México.

Methodology



A mixed method approach was used, combining quantitative and qualitative data. Information from books, articles, websites and field observations of beekeepers, exporters and laboratories is used.

The business plan is based on Balanko (2007), "How to prepare a Successful Business Plan", and is divided in to nine sections, that provides insight into important business aspects and evaluates the entrepreneur potential. The business plan is not linear, information is used in every chapter, so it is important to review several times and complete each chapter until every chapter is ready to present it to an investor and use it in business operations.

Results

The business plan provides an overview of the business environment, with a focus on the state of Yucatan. This project offers technological solutions to beekeeping in Yucatan, where around 7,000 beekeepers depend on honey sales. Beekeeping in Mexico is one of the main agricultural economic activities; in 2021, the country ranked 7th worldwide showed in figure 2 (Mena-Roa, 2023). Market analysis identified that producers and exporters consider it a priority to differentiate authentic honey from adulterated products. One solution has been laboratory services, which requires long and high costs, limiting their use in difficult circumstances.

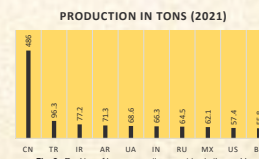
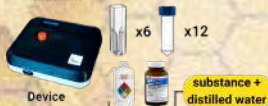


Fig. 2. Ranking of honey exporting countries in the world

Initial kit*



*The starter kit is a preliminary concept that may be modified in the future.
Fig. 3. Starter kit, device and tools for honey authenticity testing.

Therefore, an innovative, portable and quick device (figure 6) is proposed that, through a patented scientific procedure (MX/a/2015/01788), guarantees honey authenticity. It will be sold in a starter kit with 60 tests, showed in figure 3, covering two annual honey harvests. The device also incorporates 3D printing technology with recyclable materials and reusable components up to 10 times. The business model will be based on the initial kit and refills in packs of 50 and 100 tests. The break-even point is projected for the second year, with financial stability by the third year.

The project's vision and mission are to lead the development of natural food authentication technologies through affordable and reliable devices that guarantee transparency throughout the value chain. The marketing strategy will focus primarily on product positioning, including collaborations with associations and participation in industry trade shows and events. To support this, management structure is flexible and divided into three areas: administrative, marketing, and production (figure 4). Tasks will be distributed among these areas to maintain efficiency and avoid overload.



Fig. 4. Organizational chart.



Fig. 5. Future business phases.

The implementation plan continues to be developed, structured in three major phases (figure 5): (1) pilot and field validation, and market launch, (2) national expansion and, (3) international scaling in the future. Risks include fluctuations in honey prices, regulatory barriers, and potential slowdown in initial adoption. The main strategy is to establish the device to become an official verification tool, expand on to other beekeeping-related products, and secure financial investments.

Conclusions

This business plan demonstrates an opportunity to position a new device in the Mexican beekeeping sector. Financial projections indicate sustainability within three years. This business will help beekeepers and exporters verify the authenticity of honey, protecting production and its competitiveness in local, national and international markets.

This business is an innovative proposal which contributes improving the competitiveness of Mexican honey in international markets, and enhances traceability throughout the honey supply chain and responsible production and consumption.

References

- Baena-Díaz, F., Chávez, E., Ruiz De La Merced, F., & Porter-Bolland, L. (2022). *Apis mellifera* en México: producción de miel, flora melífera y aspectos de polinización. *Revisión. Revista Mexicana de Ciencias Pecuarias*, 13(2), 525-548. <https://doi.org/10.22319/rmcp.v13i2.5860>
- Balanko, G. (2007). *Como preparar un exitoso plan de negocios* (1st ed.). [Libro]. McGraw-Hill / Interamericana de México. https://economias.unam.edu.ar/afan/informacion_general/bookbooks/Como%20preparar%20un%20plan%20de%20negocios%20de%20libro.pdf
- Mena-Roa, W. (2023, May 22). China, el principal productor de miel del mundo. *Statista Daily Data*. <https://es.statista.com/graficos/30038/paises-con-el-mayor-volumen-de-produccion-de-miel-natural/>



Fig. 6. 3D printed device, USB-C charged, lightweight and compact

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INTRODUCTION: The importance of honey authenticity is becoming more relevant today due the adulteration of this product in the world market; affecting not only exporters but also beekeepers.

Problem/OBJECTIVE: Honey is one of the main exportation products of Mexico, which is sent to countries such as Germany, USA, UK, Switzerland and Netherlands, with earnings of up to 2.25 million dollars in 2024. However, adulteration has increased from 14% to 35% between 2019 and 2021. There are reports in the media by scientists and businesses mentioning that adulteration will increase up to 60% in the worldwide. This is why a product is needed that quickly identifies adulterated honey, in our institute it has been designed and constructed a device to detect adulterated honey based on the patent MX/a/2015/017884. The main objective of this research is to create a business plan with its benefits and advantages in a business environment. We are presenting the structure of a business plan for the marketing of a product that detects adulteration in honey quickly.

Main results and conclusions

The business plan allows you to visualize the business environment, which in this project focuses on the state of Yucatan. This project offers technological solutions to beekeeping in Yucatan, where around 7,000 beekeepers depend on the sale of honey. The investment they make to maintain their hives and guarantee the purity of their product has been analyzed. The device can not only be considered as a purity reversal advantage, it also includes 3D printing technology with recyclable materials and reusable component up to 10 times. It will be sold in an initial kit with 60 tests, covering two annual honey harvests.

The business model focuses on promoting fair trade and improving traceability of honey to facilitate its export. It is estimated that profits will be reinvested in technological improvements and research.

Practical implications for beekeepers

This business will help beekeepers and exporter verify the authenticity of honey, protecting production and its competitiveness in local and international markets.