

# A BUSINESS MODEL FOR NURSERY PRODUCTION OF CACTI FROM THE CHIHUAHUA DESERT

*A conservation strategy under the administrative process review*

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## Abstract

With the presence of about 52 genus and 850 species, Mexico is considered as the biggest center of diversity for the Cactaceae family. About 84% of these species are only found in our country and in no other part of the world, consider themselves an endemic family of México. Unfortunately over 75% of all species of cacti are in decline, due to anthropogenic activity. The work performed in nurseries to produce high-quality native and traditional plants helps perpetuate these species. Nursery-grown native plants overcome barriers to natural recolonization, such as weed competition, animal predation and lack of a natural seed bank. There are several steps that need to be completed in order to establish a plant nursery. Several factors need to be considered, such as the quality of the water, the location, the specific areas of plant production, among others. Planning, organizing, leading and controlling are very important stages of the administrative process that need to be determined for the project to work the best way possible. As a result of this work, a proposal for a CANVAS business model for the production of cactaceae is presented. The documentary analysis carried out shows a potential viability for the development of a project that allows the production of cacti in nurseries for its distribution or commercialization.

**Key Words:** *Plant production, entrepreneur, endemic, CANVAS.*

## Resumen

Con la presencia de aproximadamente 52 géneros y 850 especies, México es considerado como el mayor centro de diversidad para la familia Cactaceae. El 84% de estas especies sólo se encuentran en nuestro país y en ninguna otra parte del mundo, considerándose una familia endémica de México. Desafortunadamente, más del 75% de todas las especies de cactus están en declive debido a actividades antropogénicas. El trabajo realizado en viveros para producir plantas nativas y tradicionales de alta calidad ayuda a perpetuar estas especies. Las plantas nativas cultivadas en viveros superan las barreras a la recolonización natural, como la competencia de malezas, la depredación animal y la falta de un banco de semillas natural. Hay varios pasos que deben completarse para establecer un vivero de plantas. Se deben considerar varios factores, como la calidad del agua, la ubicación, las áreas específicas de producción de plantas, entre otros. La planificación, organización, dirección y control son etapas muy importantes del proceso administrativo que deben determinarse para que el proyecto funcione de la mejor manera posible. Como resultado de este trabajo se presenta una propuesta de modelo de negocio CANVAS para la producción de cactaceas. El análisis documental realizado, muestra una potencial viabilidad para el desarrollo de un proyecto que permita la producción de cactaceas en viveros para su distribución o comercialización.

**Palabras clave:** *Producción de plantas, emprendimiento, endémico, CANVAS.*

## Introduction

### The *Cactaceae* family in the American continent and Mexico

Among all the succulent families, *Cactaceae* is the largest with 1,400 to more than 2,000 species, depending on the author. This family originated in the American continent, going from the South of Canada all the way down to La Patagonia (Arredondo, 2002). Although there is very few or none fossil registers of cacti, studies made by specialists consider the tropical dry zone of South America the most probable center of origin of this family (Becerra, 2000). According to Salas (2014) nowadays it has been reported a diversity of 111 genus and approximately 1,500 native and original species of cacti from the American continent. With the presence of about 52 genus and 850 species, Mexico is considered as the biggest center of diversity for this family, and not only that, also have a high degree of endemism, with approximately 18 out of the 52 genus, 35%, in the Mexican territory and 715 of all the cacti species, 84% in the country occurring only in Mexico (Becerra, 2000).

### Cacti in the context of the Chihuahuan desert

Of all the Mexican deserts, the Chihuahuan desert, known as the Chihuahuan Desert Ecoregion (CDE), is one of the most important centers of cactus diversity, sheltering the biggest wealth of cacti in the world, with 329 species, (Bárcenas, 2006; Pérez, Santos, Ramírez & Ochoa, 2015). More than 20% of Cacti species of the continental total grow in this desert. The cacti of the CDE are characterized by their sizes, ranging from small to medium, their restricted geographical distributions and their slow growth rates, (Bárcenas, 2006).

### Importance of cacti

Cacti play important roles in various areas. They have been widely used in the production of food for humans and as fodder for animals; as medicinal and religious plants by ethnic groups of Mexico like the Raramuris, the Yaquis, the Huicholes, among others; as ornamental plants due to their bizarre growth-forms and attractive colorful flowers; and as a source of pigment for dyes -*Dactylopius coccus*-; they also have an ecological role, their broad and shallow root system influence soil erosion processes, while their flowers and fruits are attractive and an important food source for birds, bats, reptiles and

insects and in turn, these animals potentially act as effective pollinators and seed dispersers, among a lot of other uses, (Lebgue, et al, 2011; Lema & Kulus, 2014; Cavalcante, Gomes, Vasconcelos, & Meiado, 2017).

### The precarious situation of cacti

Unfortunately, cacti and succulents are being threatened by anthropogenic activities like deforestation, climate change, native and man-introduced plagues, and illegal extraction and commercialization. Over 75% of all species of cacti are in decline (Hultine et al., 2016). Of all the existing cacti in Mexico, 276 species appear in either category of the NOM-059-SEMARNAT-2010's list of species at risk, making it about 32.5% of all species in the Mexican territory. 12 out of 17 genus that occur in Chihuahua have one or more species appearing in the Normative annex III of the NOM-059-SEMARNAT-2010, making it 30 species that belong to either category of the list, as you can see in Table 1 (SEMARNAT, 2010; Lebgue et al., 2011). The great national and international demand for specimens of the CDE species, for horticultural purposes, coupled with their biological characteristics, place them as one of the most threatened botanical families on the planet (Bárcenas, 2006). This is why is important to design conservation strategies, do research, educate people on cacti culture, produce, distribute or sale.

*Chihuahua's cacti species that appear in the list of endangered species of the NOM-059-SEMARNAT-2010*

| Genus                 | Species                | Subspecies / va-<br>riety | Distribution | Category  |
|-----------------------|------------------------|---------------------------|--------------|-----------|
| <i>Ariocarpus</i>     | <i>fissuratus</i>      | <i>bravoanus</i>          | <i>E</i>     | <i>P</i>  |
| <i>Ariocarpus</i>     | <i>fissuratus</i>      | <i>hintonii</i>           | <i>E</i>     | <i>P</i>  |
| <i>Coryphantha</i>    | <i>gracilis</i>        |                           | <i>E</i>     | <i>P</i>  |
| <i>Coryphantha</i>    | <i>poselgeriana</i>    |                           | <i>E</i>     | <i>A</i>  |
| <i>Coryphantha</i>    | <i>ramillosa</i>       |                           | <i>not E</i> | <i>A</i>  |
| <i>Echinocereus</i>   | <i>adustus</i>         |                           | <i>E</i>     | <i>A</i>  |
| <i>Echinocereus</i>   | <i>palmeri</i>         |                           | <i>not E</i> | <i>P</i>  |
| <i>Echinocereus</i>   | <i>stoloniferus</i>    |                           | <i>E</i>     | <i>Pr</i> |
| <i>Echinocereus</i>   | <i>subinermis</i>      |                           | <i>E</i>     | <i>Pr</i> |
| <i>Echinomastus</i>   | <i>intertextus</i>     |                           | <i>not E</i> | <i>A</i>  |
| <i>Echinomastus</i>   | <i>mariposensis</i>    |                           | <i>E</i>     | <i>A</i>  |
| <i>Echinomastus</i>   | <i>unguispinus</i>     | <i>durangensis</i>        | <i>not E</i> | <i>A</i>  |
| <i>Echinomastus</i>   | <i>unguispinus</i>     | <i>unguispinus</i>        | <i>E</i>     | <i>Pr</i> |
| <i>Echinomastus</i>   | <i>warnockii</i>       |                           | <i>not E</i> | <i>Pr</i> |
| <i>Epithelantha</i>   | <i>micromeris</i>      | <i>bokei</i>              | <i>not E</i> | <i>A</i>  |
| <i>Epithelantha</i>   | <i>micromeris</i>      | <i>micromeris</i>         | <i>not E</i> | <i>Pr</i> |
| <i>Escobaria</i>      | <i>dasyacantha</i>     | <i>chaffeyi</i>           | <i>not E</i> | <i>Pr</i> |
| <i>Ferocactus</i>     | <i>haemata-canthus</i> |                           | <i>E</i>     | <i>Pr</i> |
| <i>Glandulicactus</i> | <i>uncinatus</i>       | <i>uncinatus</i>          | <i>E</i>     | <i>A</i>  |
| <i>Lophophora</i>     | <i>williamsii</i>      |                           | <i>not E</i> | <i>Pr</i> |
| <i>Mammillaria</i>    | <i>grusonii</i>        |                           | <i>E</i>     | <i>Pr</i> |
| <i>Mammillaria</i>    | <i>lindsayi</i>        |                           | <i>E</i>     | <i>Pr</i> |
| <i>Mammillaria</i>    | <i>longiflora</i>      |                           | <i>E</i>     | <i>A</i>  |
| <i>Mammillaria</i>    | <i>marksiana</i>       |                           | <i>E</i>     | <i>Pr</i> |

|                    |                           |              |           |
|--------------------|---------------------------|--------------|-----------|
| <i>Mammillaria</i> | <i>saboe</i>              | <i>E</i>     | <i>A</i>  |
| <i>Mammillaria</i> | <i>senilis</i>            | <i>E</i>     | <i>A</i>  |
| <i>Mammillaria</i> | <i>stella-de-tacubaya</i> | <i>E</i>     | <i>Pr</i> |
| <i>Opuntia</i>     | <i>arenaria</i>           | <i>not E</i> | <i>Pr</i> |
| <i>Opuntia</i>     | <i>bravoana</i>           | <i>E</i>     | <i>Pr</i> |
| <i>Peniocereus</i> | <i>greggii</i>            | <i>not E</i> | <i>Pr</i> |

Initials on the “Distribution column are for:  
*A.* Threatened  
*E.* Endemic  
*Not E.* Not endemic  
*P.* In Danger of Extinction  
*Pr.* Subject to Special Protection

Self-made table with data from SEMARNAT (2010) and Lebgue et al., (2011).

Table 1

The role of nurseries in the conservation of cacti species

The work performed in nurseries to produce high-quality native and traditional plants helps perpetuate these species. Nursery-grown native plants overcome barriers to natural recolonization, such as weed competition, animal predation, and lack of a natural seed bank. Nursery-grown endemic species ensure heritage varieties, and culturally important characteristics are passed on to the next generation (Wilkinson et al., 2014). Besides this, nurseries provide other different kind of plants, employment, knowledge and economic benefits. Therefore, it is important to design conservation strategies, research and educate people about sustainable exploitation of cacti. Thus, as to creation of production programs for the reintroduction of some species to their natural environment.

Ornamental cacti in Mexico

According to Gámez et al. (2016) the whole Cactaceae family has 59 genus and 675 species identified as ornamental plants. In Mexico, the “Red Cactáceas”, a subdivision of the “Servicio Nacional de Inspección y Certificación de Semillas” (SNICS), has identified 129 species as ornamental plants, being Ariocarpus, Astrophytum, Aztekium, Coryphantha, Digitostigma, Echinocactus, Echinocereus,

Epithelantha, Escobaria, Ferocactus, Geohintonia, Leuchtenbergia, Mammillaria, Pelecypora, Turbinicarpus, Stenocactus and Thelocactus the genus with more attention (Gámez et al, 2017)  
Cacti business model with the administrative process as guideline

Planning a Cacti nursery

The planning phase for the establishment of a cactus production nursery is an opportunity to step back and clarify the vision and goals of production and to coordinate all the components necessary to achieve these goals. Among the important factors to consider are; the choice of the land with the minimum resources such as water, security and no access for animals or people who harm, as well as sufficient resources for the installation of more complex structures if required (Reyes, 2009). In addition, protecting the health and diversity of the ecosystem must be considered (Wilkinson et al., 2014). Although the planning of a cactus nursery is complex, the basic formula for establishing it is to answer the questions of why, who, what, how, where, when and what (Table 2). Once those questions are answered, the business structure can be developed (Schuch, 2017; Wilkinson et al., 2014). Generating a business plan for the production of cacti is a set of guidelines that will help determine the type, market, location, site,

design and size of the operation.

In addition, it will establish specific details on equipment and employee requirements, operational costs, estimated pricing schemes, projected return on investment, and asset availability (Sellmer & Dana, 1994). Finances are an essential part of determining how a nursery will start and operate, how much money can be invested in the nursery at the outset, if staff can be hired, in what timeframe the nursery can start to produce plants for sale, how many plants can be produced and what price can be charged for the plant materials. Even if plants are to be distributed freely and not sold, it is still essential to know the cost to produce each kind of plant for planning, assessing feasibility, and ensuring the financial viability of the nursery (Wilkinson et al., 2014).

### Defining the market

To define the market and get to the right segment, it is necessary to consider the following aspects:

- What is truly needed and wanted in the community? Use local and national industry association data and commercial publications to determine market trends.
- Who are the potential clients of plant's materials at this time? Define the types of customers within the target market (average salary, average number per household) based on census and local Chamber of Commerce data.
- What are the needs and priorities of the potential clients? Determine customer preferences for products and services through questionnaires and interviews and by investigating the local competition; anticipate future preferences on the types and number of plants to grow.

### Type of nursery

The two basic types of nursery production systems are growing plants in containers or in the field. Each production system has different requirements for land, structures, equipment, and labor. The location of a new nursery, water quality, access to raw materials, labor, services and infrastructure are also important factors to assess depending on what production system is chosen. Container production takes advantage of year-round growing and marketing, compared to the more seasonal harvesting of field-grown nursery

plants. Land quality and size are critical characteristics for a field nursery. Soil workability, texture, depth, and drainage are vital for field production while they are of lesser concern for a container production site. The production of container plants is most popular because of their great flexibility of almost year-round production. The lighter weight of container plants grown in organic medium reduces shipping costs compared to plants grown in the field that have a heavier root ball with mineral soil (Schuch, 2017).

### Licences and permits

The initial investment beyond obtain financing, suitable land, buildings, equipment, supplies, and labor will also include utilities, insurance, interest on loans, taxes, inspections and appropriate permits and licenses (Sellmer & Dana, 1994; Schuch, 2017). Botanic Gardens and nurseries could play an important role in 'rescuing' succulent plants from sites threatened by development projects (Oldfield, 1997). However, according to Bárcenas (2006) Mexican legislation on natural resources prohibits the trade of specimens, parts or their derivatives collected directly from their habitats for sale or commercialization, but allows, with appropriate authorizations, the collection of a small number of specimens for propagation and subsequent commercialization. On the other hand, it is important to approach with institutions such as the National Commission for the Knowledge and Use of Biodiversity, National Institute of Ecology, Federal and State Government, among others, that through the Mexican Strategy for Plant Conservation, guide actions knowledge, conservation and use of plant diversity in Mexico, allowing the prevention and control of over-exploitation and trade in plant species.

### Propagation environment

When propagating Cactaceae, spaces are required for: a) germination, which is the area where seed and sowing treatments are carried out; b) development, which is the place where plants individually reach the commercial size for sale; and finally, c) the conservation area of the mother plant, which is where the production and harvest of seeds is controlled. The main objective of these areas is to have space and infrastructure where aspects such as temperature, light and humidity are controlled, depending on the what the plants need (Arredondo, 2002)

Table 2  
Adminstrating stages of a nursery for plant production

| Planning   |  | Organizing   |  | Leading  | Controlling  |  | Improvement |
|--|--|--|--|--|--|--|-------------|
| Stablishting the vision  |  | Coordinate activities and resources to meet the objectives   |  | Managing, motivating and directing   | Monitoring and evaluating activities   | Anticipate, expand and plan  |             |
| Answer the questions   |  | Financial resources  |  | Staff  | Record keeping   | Learning   |             |
| Why to start a nursery?<br>Who are the customers?<br>What will the nursery grow?<br>How will the plants be propagated, and the nursery be managed?<br>How will the product be distributed?<br>Where will the nursery be located?<br>When will be best to carry out production tasks?<br>Which permits and legal requirements need to be met? |  | <ul style="list-style-type: none"><li>• Determine expenses, including labor, time and supplies needed to produce crops, and overhead costs.</li><li>• Determine estimated income.</li><li>• Create and manage an annual budget based on anticipated income and expenses.</li><li>• Administer contracts.</li><li>• Estimate future costs and income and adjust budget accordingly.</li></ul> |  | <ul style="list-style-type: none"><li>• Provide staff education and training.</li><li>• Connect staff with nursery vision and objectives.</li><li>• Give and receive feedback and input.</li><li>• Plan meetings, safety awareness, and so on.</li></ul> | <ul style="list-style-type: none"><li>• Record observations and actions in daily log.</li><li>• Make notes in the plant development records for each grow-form.</li><li>• Update and revise plant protocols (at end of each grow-form).</li><li>• Conduct crop inventory assessment.</li></ul> | <ul style="list-style-type: none"><li>• Attend training events and conferences.</li><li>• Learn from other nurseries; host and attend field days and visits.</li><li>• Read published literature (E.g., Native Plants Journal, Cactus Journal, Succulent Journal, Journal of the Professional Association for Cactus Development, International Cactus Adventures).</li><li>• Explore ways to improve crop production and plant quality.</li></ul> |             |
| Things to consider   |  | Plant Materials  |  | Clients  | Problem solving  |  |             |
| • Market   |  | • Establish propagation protocols.   |  | • Develop target plant specifications with clients.  | • Identify and analyze problems as they arise.   |  |             |
| • Type of nursery  |  | • Create and update crop-growing schedules.  |  | • Educate clients about key issues for handling, outplanting, and care.  | • Know who to call for help (E.g., another grower, a soil scientist, a pest expert, an irrigation specialist) and contact them as needed.  |  |             |
| • Licences and permits   |  | Activities   |  | • Visit outplanting sites and clients to check up on survival and growth; follow up with clients to discuss field performance of plants and future needs.  | • Implement a solution.  |  |             |
| • Soil   |  | • Irrigate   |  |  |  |  |             |
| • Irrigation water   |  | • Crop culturing (E.g., weed or pest control, fertilizing).  |  |  |  |  |             |
| • Location   |  | • Monitor and observe the crops.   |  |  |  |  |             |
| • Propagation environment  |  | • Purge or transplant holdover stock.  |  |  |  |  |             |
| Set objectives   |  | • Clean floors, tables, tools, equipment, and so on.   |  |  |  |  |             |
| • Refine nursery vision and objectives.  |  | • Check and repair equipment, tools, and infrastructure such as irrigation lines.  |  |  |  |  |             |
|  |  | Human resources  |  |  |  |  |             |
|  |  | • Make a list of what needs to be done based on daily observations, daily logs, and crop development records.  |  |  |  |  |             |
|  |  | • Prioritize and delegate tasks.   |  |  |  |  |             |
|  |  | • Follow up to ensure tasks were done.   |  |  |  |  |             |
|  |  | Production tasks   |  |  |  |  |             |
|  |  | • Establishment tasks (E.g., growing media, sowing seeds, inoculating with beneficial microorganisms).   |  |  |  |  |             |
|  |  | • Rapid growth phase tasks (E.g., fertilizing, monitoring).  |  |  |  |  |             |
|  |  | • Hardening phase tasks (E.g., changing fertilization and light regimes).  |  |  |  |  |             |
|  |  | • Harvesting, packing and shipping tasks.  |  |  |  |  |             |

Self-made table with data from Wilkinson et al., (2014).



### **Irrigation water quality**

Of all the needs of plant production, the availability of ample, high-quality water is most important. It is necessary to determine the water source and limitations, prior to purchasing land and starting in the nursery business. Since water quality is so vital, testing of the water quality prior to determining the nursery site is critical (Sellmer & Dana, 1994). For irrigation purposes, water quality is determined by two factors: 1) the concentration and composition of dissolved minerals often referred to as “soluble salts” or “dissolved salts,” and 2) the presence of harmful fungi, weed seeds, algae, and possible pesticide contamination, (Dumroese, Landis, & Luna, 2012).

### **Soil**

It is important too that get to know the type of soil of the terrain. Contracting for soil testing and a soil survey will help to determine soil quality and characteristics which will be useful in determining the nursery layout and production areas. Container growing medium can be brought from remote locations. However, good soil on site as a resource in media construction may be useful. A firm surface which allows for the placing of containers and insures surface drainage is a must (Sellmer & Dana, 1994).

### **Soil Drainage**

An important aspect in establishing a cacti nursery is the drainage of the soil or substrate to be used. During germination it is recommended to use a mixture of soil and fine gravel that allows good drainage; considering that it should have little organic matter and a pH close to neutral (6.0 to 6.5). For transplantation, it is recommended to use a mixture of fine tezontle or agrolite and sieved black earth (with well degraded organic matter and a slightly acidic pH of 5 to 5.5), which can allow good drainage. Good drainage will mainly prevent the generation of fungal diseases and will improve oxygenation and therefore the development of the root system of plants (Reyes, 2009).

### **Location**

The location of the nursery may be predetermined based on availability of property or for personal reasons. Alternatively, you may be free to choose a location that best suits your needs and goals. In either case, the location choice will directly affect

the marketing decisions, employee hiring, and future expansion. Other factors to consider include availability of transportation facilities, distance to market, competition, availability of reliable labor (full-time, part-time, and seasonal), and availability of inexpensive land for future expansion. Site selection and layout are very important in the early stages of the planning process.

### **Organizing**

This phase involves an understanding of practical, scientific and technical aspects of growing plants, such as management of the environment, plant nutrition and irrigation, pests and diseases. On the same way it needs to organize the business processes such a managing production, labor, customers, distribution, marketing, etc. Skills in this areas are essential for a nursery to be successful (Schuch, 2017). Nursery management includes ordering materials and supplies, maintaining facilities, scheduling activities, keeping horticultural and financial records, and much more (Wilkinson et al., 2014). A checklist can help provide an overview of the inter-related tasks involved in managing a nursery (Table 2).

### **Growing and facilities schedules**

To develop a growing schedule that covers all phases of crop production and the time necessary to complete each step, propagation protocol is needed. Knowing when propagules can be collected and how long the species will take to produce enables the nursery to work with clients' schedules. On the other hand, the goal of facilities scheduling is to ensure that the nursery facilities and resources required to meet plant needs through the growing cycle are available at the appropriate times. The space, labor, equipment, and supplies required for each crop during the different stages of propagation must be planned. A good facilities plan considers crop layout, that is, what crops and supplies go where in the nursery. This layout is planned to effectively provide appropriate growing requirements (temperatures, sunlight) and other cultural requirements (frequency of fertilization, watering, or other treatments) for all the crops grown

each season (Wilkinson et al., 2014).

### Leading

With this function all the knowledge is applied in decision taking in order to reach the goals established in the planning phase. Success on producing healthy, vibrant plants, depends not only on the ability to produce quality plants, but also on the ability to work effectively with people. Staff need to be trained to observe the crops, detect problems, and understand and carry out their direct responsibilities. Clear communication is core to great employee relations. The daily communication with staff will be to assign roles, tasks, and goals. It is important to encourage dialogue and be open to feedback from employees about how they think they can work more efficiently. It is relevant to provide feedback to staff so they can optimize the value of their work. Brief, weekly meetings are valuable for linking the day-to-day tasks with the nursery's vision (Wilkinson et al., 2014).

### Controlling

By keeping record of all what is done in the nursery basis are created in which the nursery all kind of aspects can be improve, so it suits goals. Propagation protocols should be revised on a seasonal or annual basis, becoming more accurate each year, which then improves the usefulness of the crop and facilities schedules. The best way to improve the accuracy of the protocols is to keep two kinds of written records:

1. The daily log. It is a journal that notes nursery conditions, activities, and management practices on a daily basis.
2. Regular plant growth records. A plant development record notes what is happening with a crop of plants from crop initiation through delivery. When these records are reviewed, the information enables nursery managers to determine if intended improvements actually had a positive effect on plant health and growth compared with what was

normally done.

### The Business Model CANVAS

A business model “describes the bases on which a company creates, provides and captures value” (Osterwalder and Pigneur, 2010). For their analysis they propose to use the CANVAS model, made up of nine modules or blocks that include the main areas of a business: value proposition, customer segment, channels, customer relationships, revenue stream, key activities, key resources, key alliances and cost structure.

According to Kaplan and Norton (1996), a business has four fundamental areas: (1) product, (2) customer perspective, (3) management of the infrastructure and (4) financial aspects which were integrated into the Osterwalder model in three key aspects:

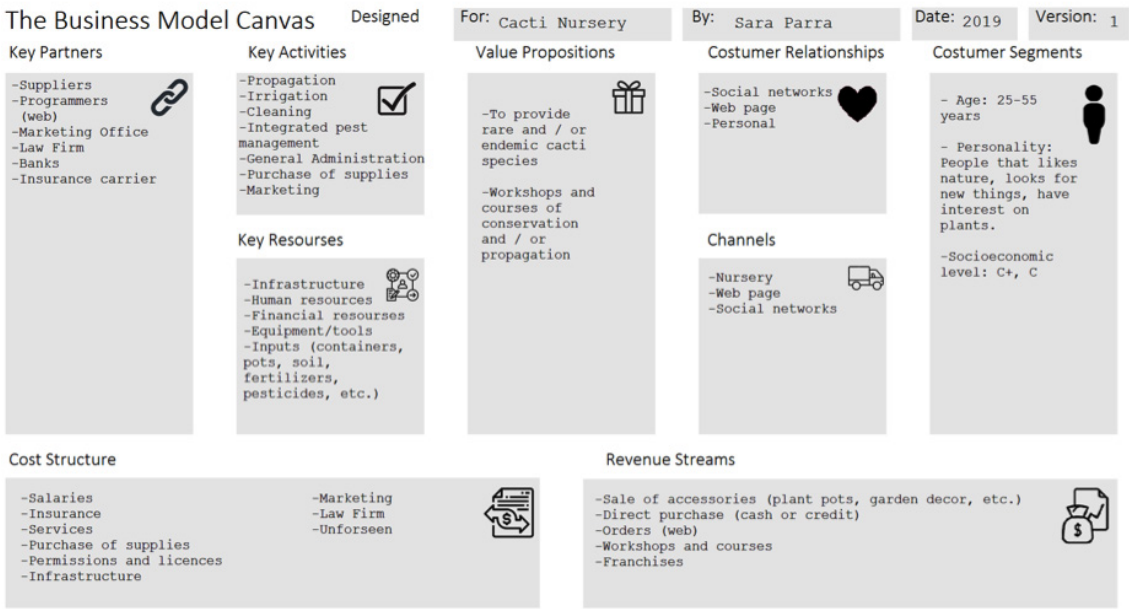
1. Integration of key components and functions to deliver value to customer;
2. the interconnection of these parties within the organization, the supply chain and stakeholders and
3. how the organization generates value through these interconnections (Chesbrough, 2010; Osterwalder, 2004)

The use of the CANVAS business model for entrepreneurs allows them to see the operation of a company as close to reality (Salas-Fumás, 2009). The business idea validation methodologies allow to follow a process that starts from a hypothetical CANVAS that refines the business idea.

### The cacti business model proposal

In order to analyze the market viability of the cacti nursery production, a proposal for an hypothetical business model CANVAS has been developed (figure 1). In this we can find the proposal for each section that the CANVAS methodology indicates, from different perspectives such as experience, knowledge and documentary research that has been developed on this subject up to now.





**Figure 1.**  
**The Cacti Nursery Business Model**  
Self-made, using the Business Model Canvas Methodology (Osterwalder and Pigneur, 2010).

Conclusions

Mexico is considered the biggest center of diversity for the Cactaceae family, and also has a high degree of endemism. Succulents and cacti are very important in various contexts. The great demand for specimens of these species for horticultural purposes, coupled with their biological characteristics, place them as one of the most threatened botanical families on the planet. Many cacti are threatened with extinction due to over collecting for horticultural purposes, slimming down the natural populations and affecting their ecological roles. There is a need to protect these plants, and nurseries are placed in a position where they can help overcome this damage, if an appropriate planning stage is carried out, setting all the corresponding objectives and goals. And for this reason, it is considered relevant to validate the idea and that this allows the development of a complete business or social project, once the aspects that minimize the risk of its implementation have been studied in depth.

Recommendations

An evaluation of such a project must be done. The feasibility assessment needs to include the species potentially available to grow, production costs, market price, and the nursery's site, goals, and capabilities. An investigation and compilation must be made about the requirements, licenses and / or permits needed for such a project. Continue with the validation of the business idea, suggesting lean methodologies. The validation of the hypothetical business model CANVAS might be done. No literature was found related to the use of the CANVAS business model to validate the idea of nursery production of cactaceae from the Chihuahuan desert. Therefore, this is considered the first time that a hypothetical CANVAS has been proposed in this regard. A small pilot nursery should be done, as an opportunity to evaluate production on a smaller scale with less risk.

## Referencias

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