

FORMULATION OF A RURAL SECTOR INVESTMENT PROJECT ALIGNED TO STANDARD EC 0020: CASE STUDY "LA LOMBRIZ PRODUCE".

FORMULATION OF INVESTMENT PROJECT OF THE RURAL SECTOR ALIGNED TO THE EC 0020 STANDARD: PRACTICAL CASE COMPANY "LA LOMBRIZ PRODUC".

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Abstract- The purpose of this article is to describe the steps for the formulation and evaluation of a rural investment project, taking as a basis the competency standard EC 0020, called "Formulation of the design of investment projects in the rural sector", which provides solid guidelines for the correct preparation and evaluation of rural investment projects. For the above, a business plan was prepared for the social enterprise "La lombriz Produce", Sociedad Civil de Responsabilidad Limitada, which is focused on the production and marketing of organic fertilizers, specifically worm humus and humus leachate, which is produced during the process carried out by Californian red worms (*Eisenia Foetida*). This work focuses on the diagnosis, analysis and formulation of the strategy, as basic elements of the Business Plan, and are based on the methodology proposed by personnel from the Instituto Tecnológico del Valle del Yaqui certified in the EC 0020 (CONOCER). The business plan is the product of the introspection carried out by the work team formed by the partners of the company La Lombriz Produce and ITVY personnel, in compliance with the requirements of EC 0020.

Key words: Investment project, Competency standard EC 0020, Organic fertilizer.

Abstract -- The purpose of this article is to describe the steps for the formulation and evaluation of a rural investment project, based on the competence standard EC 0020, called "Formulation of the design of investment projects in the rural sector" that provides solid guidelines for the correct development and evaluation of rural investment projects. For this, the business plan of the social company "La lombriz Produce", Civil Society of Limited Liability, which is focused on the preparation and marketing of organic fertilizers, specifically earthworm humus and smoke leachate, was prepared. It reproduces during the process carried out by Californian red worms (*Eisenia Foetida*). This work focuses on the diagnosis, analysis and formulation of the strategy, as basic elements of the

Business Plan, and are based on the methodology proposed by staff of the Technological Institute of the Yaqui Valley certified in EC 0020 (CONOCER). The business plan is the product of introspection carried out by the work team made up of the social partners of the company La Lombriz Produce and ITVY staff, compliance with the requirements of EC 0020.

Key words: Investment Project, Competition Standard EC 0020, Organic Fertilizers.

INTRODUCTION

Strategic management is defined as the art and science of formulating, implementing and evaluating decisions through functions that enable a company to achieve its objectives [1].

The strategic management process has three stages: strategy formulation, strategy implementation and strategy evaluation.

For the purposes of this paper, the term strategy is considered as the statement of the company's missions, the establishment of objectives in light of internal and external forces, the formulation of specific policies and strategies to achieve the proposed objectives and ensure their proper implementation, so that the basic purposes of the organization are achieved [2].

Strategy formulation includes creating a vision and mission, identifying a company's external opportunities and threats, determining internal strengths and weaknesses, setting long-term goals, creating alternative strategies, and choosing specific strategies to pursue [3].

In this context, [4] states that an investment project is a plan that, if allocated a certain amount of capital and provided with inputs of various types, will produce a good or a service, useful to society. The evaluation of an investment project, whatever

The purpose of this is to know its economic and social profitability, in such a way that it assures the solution of a human need in an efficient, safe and profitable way. Only in this way is it possible to allocate economic resources to the best alternative.

The preparation of an investment project for a Social Sector of the Economy Organization (OSSE) is not an easy task due to the amount of information and the level of knowledge required, and it is necessary to have the advice of competent personnel and/or a guide for its preparation [5].

The world of projects has changed, there are no magic formulas for working on investment projects, so we must adopt new models of thinking based on design rather than formulation [6].

The purpose of any **investment project** will be to solve an identified and clearly characterized problem or need, and the solution must generate a positive and substantial impact on the population directly affected by the phenomenon of interest. It is therefore necessary to identify the population to which the project will be directed [7].

Under this premise, CONOCER, as a parastatal entity sectorized in the Ministry of Public Education, has a tripartite governing body, whose purpose is to provide an instrument to strengthen economic competitiveness, growth capacity and social progress for the benefit of Mexico, through the National System of Competences (SNC) of people [8], being the SNC an Instrument of the Federal Government that contributes to the strengthening of people's competences, understanding by competences the integral actions to identify, interpret, argue and solve problems with suitability and ethical commitment, mobilizing the different knowledges: being, doing and knowing [9].

The EC 0020 allows verifying that a project is developed with the required effectiveness to achieve the objectives set [10], such is the case of the civil society "La Lombriz Produce" in Ciudad Obregón, Sonora.

The design of new investment projects should promote a life cycle, therefore, criteria have been established for their development [11], for example, the competence standard EC 0020 "Formulation of the design of investment projects in the rural sector", allows to verify that it is developed with the required effectiveness to achieve the objectives [12], such is the

case of the social group "BioTiesto" in the Yaqui Valley, BÁCUM, Sonora [13].

The main condition for the design of a project is to recognize the problem or need to be solved; therefore, its description precedes the preparation and study of the solution alternatives. In this sense, this investment project is aligned with the guidelines of EC 0020, and aims to solve the unemployment problem of its members, as well as to improve the supply of organic fertilizers through rural investment projects based on a design in accordance with the provisions of the Sustainable Rural Development Law [14]. One of the central aspects in the design of an investment project, in addition to the identification of the problem, is the proposal of alternatives to solve it. A comprehensive analysis of these alternatives will make it possible to define the most appropriate option and evaluate the viability of the rural investment project.

Given the existence of several possible alternatives, it is mandatory to establish, through the application of decision-making methodologies, the alternative that best suits the problem, taking into account the resources and other factors that may affect its feasibility.

METHOD

The method to be followed in this work consisted of the following steps:

1. Formation of the work team made up of professors from the Instituto Tecnológico del Valle del Yaqui (ITVY), the company's managers and its members.
2. Explanation of EC0020 to members of La Lombriz Produce.
3. Preparation of the initial version (draft) of the investment project based on the Competency Standard (CS).
4. Evaluation of the investment project using the CE Evaluation Tools.
5. Correction of nonconformities and final project review
6. Printing of the final version of the investment project.
7. Analysis and synthesis of information for the presentation of this document.

DEVELOPMENT

This investment project follows the structure of the competency standard "**Formulation of the design of investment projects in the rural sector**" EC 0020, since the purpose of this project is to serve the following purposes

as a reference for the evaluation and certification of people who work in the design of rural enterprise projects, and therefore, they must elaborate an investment project fulfilling the following four elements: 1) Diagnose the current situation and the environment of the group of members of the rural investment project, 2) establish the scenarios for the design of the rural investment project, 3) Design investment projects for rural enterprises and 4) Evaluate the viability of the rural investment project designed for rural enterprises.

Management and organizational analysis

Element 1 of the Competency Standard (CS): Diagnose the current situation and environment of the group of rural investment project members.

The project partners are originally from the Yaqui Valley, in the southern part of the State of Sonora, and are engaged in agricultural activities and home care. The average income of each person is approximately two minimum wages per day; however, the work they perform is of a temporary nature, with periods of constant unemployment.

La Lombriz Produce is a Limited Liability Cooperative Society legally constituted on January 30, 2016, is integrated by five partners and has a Board of Directors composed of president, secretary and treasurer, in addition to a Supervisory Board.

The Company is the owner of the project and the general shareholders' meeting is the highest authority, followed in hierarchical order by the Board of Directors and the Company's legal representative, who has the same powers as the Board of Directors.

By agreement of the partners' meeting, the partner with experience in the production of organic fertilizers was appointed as the legal representative of the company.

The president of the board of directors has extensive experience in managing this type of farm, and the partner who serves as administrator has extensive experience in administrative aspects, but the rest of the partners do not.

The job descriptions indicate the main functions of each position as described below:

Legal Representative: He/she shall be responsible for representing the company before any authority, shall not receive any remuneration for the performance of his/her duties, and shall be entitled to profit sharing.

General Manager: He/she will be responsible for developing the administrative tasks of the company: from personnel management, purchases of supplies, sales of products, fiscal matters, etc. The steward will be his/her subordinate and will be accountable to him/her.

Steward: He/she will be directly responsible for carrying out the work required for the operation of the worm farm, supported by the seven production assistants.

Operation Assistant: They will be directly responsible for field work: compost preparation, planting in piles, planting maintenance, harvesting, etc., and will report directly to the Steward.

Therefore, La Lombriz Produce's vision is to be a company that lasts and generates profits through the quality of its products, developed with the ability and capacity of the people of the region, as well the organization of the company through the establishment of a company dedicated to the production of organic fertilizers -specifically worm humus and humus leachate-, and as a complementary product, the commercialization of worms that will reproduce during the process carried out by Californian red worms (*Eisenia Foetida*).

CE Element 2: Establish scenarios for rural investment project design.

Analysis of internal and external factors.

Currently, the members of the society work as day laborers, employees of agricultural companies, housewives or employees of businesses that generate income on a temporary basis, this average monthly income of \$ 3 000.00 (Three thousand pesos 00/100 M. N.), an amount that is far from sufficient to cover their needs and those of their families.

Among the strengths of this business project are that the partners have adequate land to establish themselves, qualified technical assistance, good sanitary control, proximity to both customers and suppliers, taking advantage of the regional market niche, motivated and happy human resources, as well as the absence of liabilities.

The company owns 2.79 hectares of land, where the facilities for organic fertilizer production will be located, and a 2000 *Chevrolet pick-up* truck with a 4,000-liter capacity rotoplastic drum, which will be used to carry out the production work required. These assets were obtained through the signing of gratuitous bailment contracts.

All the members of the company will also receive an equitable distribution of profits, a situation that will support their current income, in addition to the hiring of all the partners by generating nine direct jobs, with the consequent improvement in their current economic situation and for the community.

The company has two female members who hold the positions of president and secretary of the Supervisory Board, so they will be actively participating in the decisions and the direction taken by the company. In addition, the rest of the partners will actively participate in the directives of the company, as they are taken jointly, with all partners participating on an equal footing, that is to say, each of them casting one vote.

With the start-up of this organic fertilizer production project under a controlled and technified environment - shade house- it is expected to provide direct employment to nine people in addition to an estimated five indirect jobs, it is estimated that the economic benefit generated will be approximately \$ 2'190,885.00 per year, between costs and income, according to financial projections made by ITVY's staff.

Competitive profile matrix analysis.

The production chain of organic fertilizers in the region does not represent a problem, since the existing companies handle production volumes that are not high, and the demand for this type of product has increased in recent years due to the constant increase in inorganic fertilizers.

On the other hand, with the increase in the demand for organic fruit and vegetable products by consumers in the United States, agricultural producers are beginning to venture into this type of organic agriculture. -The trend the consumption of organic fertilizers is tending to grow.

In addition to the above, a high percentage of the producers that produce organic fertilizers so with the purpose of applying it on their land, so they are for self-supply, selling few surpluses and presenting a variable supply that cannot be seriously considered by the demanding market for these products. The main commercial companies in the agricultural regions that will be the target market for products produced by La Lombriz are mentioned in Table 1.

Table 1. List of companies with commercial operations in the agricultural regions: Costa de Hermosillo, Vallen del Yaqui and Valle del Mayo, in Sonora.

GI Fertilizer	Global Organics de México, S.A. DE C.V.	Fujol Cano Raúl Rolando	JCO Fertilizer
Agri Star Mexico	Pro-Terra Inputs	López Dumas Martin de Jesus	Rubio Silva Luis Mariano
BIOCAMPO	Distribuidora Soacada del Noroeste S.A. DE C.V.	GL Fertilizers, S.A. DE C.V.	Organic Fertilizers of Sonora
Fertilizers Tepeyac, S.A. DE C.V.	Aceves Zubia Susana	Organic Nature Mexico	Tara Fertilizers S.A. DE C.V.
Agrochemicals and biologicals	Agroinsumos Aleos ALEOS S.A. DE C.V.	Northern Agroindustries	Agropecuaria CONCE HO S.P.R. DE R.L.
Lopez Perez Ulices Cuauhtémoc	Valley Agricultural Industrial Association, S.A. DE C.V.	SEFERSA	Castro Castro Lope Javier
Windrows of Mexico	Fertilizers Yaqui and Mayo	Agrochemicals JAM S.A. DE C.V.	

Source: Own elaboration.

Likewise, "La Lombriz Produce" will have a good quality organic fertilizer production that will be quoted at the same prices offered by the competition. On the other hand, the worm will be marketed at a price of \$ 285.00 per kilogram -5% below the average price of the competition, which is 285.00 per kilogram-. \$ 300.00 per kilogram, because the supply is minimal, there is not much competition in the region, which will allow this product to be marketed quickly, allowing this company to gain new customers for its various products.

The market initially intended to be covered is the regional market, considering sales to producers in the agricultural, horticultural and aquaculture sectors, as well as nurseries and producers with greenhouses, among others.

Strategic Product Analysis

In order to clearly and concisely present the characteristics of the environment in which the project will be developed, which represent its opportunities or threats, as well as those within it that represent its strengths and weaknesses, it is necessary to address that the opportunities and threats can come from different areas such as economic, social, technological, legal, etc., while the strengths and weaknesses represent the aspects that should be taken advantage of to consolidate the project and the organization, and those that should be modified or eliminated to reduce its risk or failure, respectively [15].

For this reason, Table 2 contains the Strengths, Weaknesses, Opportunities and Threats Analysis matrix, better known as SWOT Analysis, which is based on the diagnosis obtained by ITVY professors from the information provided by the project partners.

SWOT Analysis Matrix.

Strengths	Weaknesses
- Adequate surface to establish the company in property of the company. - Qualified technical assistance and good sanitary control. - Strategic location due to its proximity to both customers and suppliers. - Exploitation of the regional market niche. - The company has no liabilities. Motivated and happy human resources.	- Lack of training of all personnel in the management of a worm farm. - Deficient organizational planning. - Poor access to credit. - Lack of liquidity. - Inability to make volume purchases of raw materials. - Lack of technification and systematization of processes.
Opportunities	Threats
- Strong deficit for the supply of the organic fertilizer market in the region - Little direct and indirect competition in the region - Favorable trend in the market price of products - Schemes of government support - Annual increase in demand organic fertilizers. - Possibility of expansion	- Constant increases in the price of inputs. - Scarce sources of financing. - High use of inorganic fertilizers. - Difficulties in accessing government support. - Little culture on the use of organic fertilizers.

Source: Own elaboration.

CE Element 3: Designing investment projects for rural enterprises

Product definition

La Lombriz Produce bases its business model on the production of organic fertilizers and, particularly, the production of red California earthworm humus (*Eisnia foetida*) is oriented towards the production of humus.

During the vermiculture process, water must be added daily to the niches where the red worms are located to provide the necessary humidity needs for their correct development and to stimulate their feeding.

Therefore, during *humus* production, a product is obtained that shows good qualities as an organic fertilizer and is the result of the drainage of irrigation to the niches, beds, trays or piles where the red Californian earthworm is found.

Although the main product to be obtained is humus (solid), another product is also produced which, due to the volumes produced, is of special importance for the producer and is called worm humus leachate.

Taking into account that humus is solid by nature, it is used in liquid form to facilitate its application to the plots by means of irrigation.

Therefore, for identification purposes, the two main products shown in the project can be defined as products to be used and marketed, which are shown in Table 3.

Table 3. Main outputs of the project.

Product name	Earthworm humus leachate (leachate)	Worm humus (solid humus)
Definition	It is the resultant or product obtained from the drainage of irrigation to flower beds, niches, trays or batteries used in vermiculture.	It is the resultant or product obtained through the breeding of Californian red worms, which is a product of great biological stability (biostable) which does not suffer subsequent degradation. Worm humus is the excrement of the red worm.
Presentation	Liquid	Solid
Features	Presents good physicochemical and bacteriological and bacteriological characteristics, since the source of this is humus and food of earthworm (humified compost).	It has good physicochemical and microbiological and microbiological characteristics

Source: Own elaboration.

On the other hand, the nutritional value of worm humus is not properly determined by its nutrient contents or values, since its value results from the set of qualities of this organic fertilizer, which makes it a great asset for plant production.

It should not be directly compared only the content of nutritional elements that it presents, since the totality of its characteristics should be taken into account.

They qualify it as the perfect colloid or as an ideal bridge between mineral nutrition, soil and plant.

Its value is provided by physical influence:

- It gives consistency to light and compact soils; in sandy soils it compacts while in clayey soils it has a dispersing effect.
- It makes tilling the soil easier, due to the improvement of the soil's physical properties.
- Prevents crusting and compaction.
- Helps water retention and water drainage.
- Prevents soil erosion that is lost through irrigation

CE Element 4: Evaluate the feasibility of the rural investment project designed for rural enterprises Commercialization

A telephone survey was conducted with the organic fertilizer producers identified in the region, reaching the conclusion that the current market prices are as shown in Table 4.

Table 4. Current market prices.

Product	Price (in \$)
Earthworm humus leachate (humus leachate) Per liter dispensed at production seat	3.00
Worm humus (solid humus) Per kilo dispensed at production seat	6.50
Earthworm (foot) Per kilo dispensed at production seat	300.00

Source: Own elaboration.

Recommendations for worm humus derived products

For the production and use of leachate and earthworm humus

1. The water used for this process must be potable, as well as to dilute the product before application.
2. The equipment used to prepare the humus extract should be washed with clean water before use, avoiding the use of disinfectants as much as possible.
3. The humus extract (liquid humus) must be prepared taking into consideration the official standards for organic products.

4. Humus extract (liquid humus) made without additives (such as algae, fish hydrolysate, humic acids) can be used without restrictions.
5. Humus extract (liquid humus) with additives can be applied without restriction in the production system, when it has been proven to comply with official Mexican and EPA water quality standards for bacterial indicators of fecal contamination, *e. coli* level and enterococci, which must be monitored. *Coli* and enterococci, which must be monitored.

At least 2 lots must be tested or monitored to verify that they do not exceed the restriction limits. Once analyzed and a positive opinion is obtained, it can be used without restrictions (as long as it is not altered by the addition of additives such as yeast, etc.).

If the product fails the , it can be used, but with restrictions.

- 90 days before harvest (products that are not in contact with the soil).
- 120 days before harvest (products in contact with the soil).

Note: crops that are not intended for human consumption, such as ornamentals and those intended for human consumption, such as cereals, are exempt from this test and the 90/120 day pre-harvest rule.

DISCUSSION AND ANALYSIS OF RESULTS

It can be observed that worm humus has high levels of nutrients for vegetable garden crops or garden plants, in addition to being rich in microbial terms, it contains nitrogen, phosphorus and potassium. As earthworm humus is a high quality universal organic fertilizer, the organic amendment obtained from earthworms (mainly with Californian red worms) is the result of their surplus.

This process is carried out primarily to strengthen the plants and avoid pollution with great impact on the ecological environment. This humus is easily assimilated by plants as it contains fulvic humic acids, which serve to stimulate the rooting of any type of plant in a 100% ecological way.

It is a fertilizer widely used and has found its boom in recent years for its great benefits and properties in crops and plants.

Therefore, the fundamental basis for starting a project of this nature lies in the benefits that will be obtained in the field for greater productivity, taking into consideration the formulation and evaluation of an integral rural investment project.

Based on these results, the expected high impact of the properties and benefits that humus provides to the soil is evaluated, including: a) improvement of soil texture, b) favoring nutrient absorption by plants, c) increased water retention in the soil, d) a large increase in microbial flora, and e) allowing seeds to germinate more easily, among others.

Finally, generating this type of project will allow us to cover the consumption of this humus in the Yaqui Valley region, with all producers in the agricultural, horticultural and aquaculture sector and with producers who have greenhouses, having as a basis to produce more and without environmental contamination.

Having a diagnosis that favors a deep analysis and the construction of a strategy that integrates all the elements for the development of the business plan, with personnel certified by CONOCER in the standard of competence EC 0020 of the Technological Institute of the Yaqui Valley, facilitates the improvement of the project and increases the technical and financial viability to meet the objectives of the company to enable its partners to have permanent jobs, generating economic stability for their families and providing the region with organic products of high value for producers and in harmony with the environment.

The test guarantees for the producer are reflected in the increase in production, the prevention of the appearance of different pests in crops, the increase of energy sources for development, mainly, all in a natural and ecological way.

CONCLUSIONS

The best strategies are the path that a good entrepreneur must consider for the success of a project, in this sense an investment project of this nature generates the necessary information as the main tool to obtain the complements of the production, taking care of the environment and generating the strategies of high impact and more appropriate to achieve the objectives set,

taking into consideration the different scenarios presented to determine the SWOT analysis and ensure the successful implementation of the project, with a high percentage of acceptance by producers and convinced that their business plan in the investment will be positive results. The use of a method based on the EC 0020 standard provides the necessary tools and knowledge to invest in this type of rural project, in addition to having the support and advice of ITVY's certified personnel.

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