

PROPOSAL OF AN INVESTMENT PROJECT "MANUFACTURE AND SALE OF 3D PRINTS".

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Abstract This study presents an investment project proposal for a Social Sector Economic Organization (OSSE) in Ciudad Juárez, Chihuahua. It is based on the Competency Standard EC0020 of the National Council for Standardization and Labor Competencies (CONOCER), which guides the formulation of social economy investment projects located in Ciudad Juárez, Chihuahua.

The objective of this work is to support the design, development and evaluation of an investment project for an OSSE. The methodology applied included the integration of a specialized work team, the presentation of the standard to the members of the OSSE, the creation of the initial draft of the project, the evaluation using CONOCER instruments, and the generation of the final printed version of the project.

The analysis of the environment was carried out using the Internal Factors Evaluation Matrix (MEFI) and the External Factors Evaluation Matrix (MEFE), as well as a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis, identifying the project's strengths, weaknesses, opportunities and threats. The results highlighted the viability of the project with an Internal Rate of Return (IRR) of 33.5% and a Cost-Benefit (C/B) ratio of 1.042. In addition, key strategies for the commercialization of 3D printing were identified. The project proves to be both financially and operationally viable, offering significant benefits for small entrepreneurs and contributing to the economic and social development of the region. The 3D printed products made with the best materials have a high quality of life.

innovative solution for this sector in Ciudad Juárez. The 3D printed products are made with the best materials and present an innovative solution for this industrial sector, improving sustainability.

Keywords: Social economy, 3D printing, Industrial sector, Innovative analysis, CONOCER standards.

Abstract. This study presents a proposal for an investment project for a Social Sector Organization of the Economy (OSSE) in Ciudad Juárez, Chihuahua. It is based on the Competency Standard EC0020 of the National Council for Standardization and Labor Competencies (CONOCER), which guides the formulation of social economy investment projects located in Ciudad Juárez, Chihuahua.

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The project is shown to be viable both financially and operationally, offering significant benefits for small businesses and contributing to the economic and social development of the region. 3D printing products are made with the best materials and present an innovative solution for this sector in Ciudad Juárez. 3D printing products are made with the best materials and present an innovative solution for this industrial sector, improving sustainability.

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INTRODUCTION

The National Institute of Social Economy (INAES) through the document entitled Perspectives of the Social-Solidarity Economy in Mexico and Opportunities for Business Promotion Cooperatives published in 2022, mentions that the Social-Solidarity Economy (SSE) is a form of organization that considers the economic, social and environmental aspects as a potential solution to the problems that arise in a predominant economic system such as: labor precariousness, rising prices of basic goods and services, environmental destruction, food poverty, among others [1]. According to [2], there are currently four main actors involved in the promotion and development of the SSE, namely:

- The public sector, which focuses on formally constituted organizations such as cooperative societies and Social Sector Economy Organizations (OSSE).
- Universities and civil society are directed to those practices that are not necessarily formally recognized.
- Successful experiences in SSE, being represented in a more indirect way by being seen as a reference and their learnings are shared.

The National Council for Standardization and Certification of Labor Competencies (CONOCER) is a parastatal organization sectorized by the Ministry of Public Education. It is a parastatal organization sectorized by the Ministry of Public Education, which has a tripartite governing body, which aims to promote the competitiveness of the Mexican labor market.

competitiveness competitiveness, the capacity of growth and social progress, through the National System of Competencies (SNC) of individuals [3]. Since the NCS is a governmental instrument that collaborates to the strengthening of competences of individuals, through the comprehensive understanding of the performances integral to identify, interpret,

argue and provide solutions to problems with suitability and ethical responsibility, mobilizing diverse knowledge: Being, doing and knowing (Tobón S., 2010; Tobón S. P., 2010a, cited in [4].

A project is the pursuit of an intelligent answer to the established question, which often solves a human hardship. Therefore, so many concepts, technologies and methodologies can be established that address approaches aimed at satisfying the human being in a comprehensive manner [5].

The design of new investment projects should promote their long-term existence, so criteria have been established for their development. For example, the competency standard EC0020 "Formulation of the design of social economy investment projects", which allows verifying its effectiveness in achieving the objectives [6], such is the case of this entrepreneurial company Disersol from Ciudad Juarez, Chihuahua.

The company in such investment project follows all EC0020 guidelines; it is used for such reference for the creation of projects so that they comply with the fundamentals mentioned in this article.

DEVELOPMENT

Materials

This work is based on the competence standard (EC0020) of CONOCER Figure 1), called "manufacture and sale of 3D printing", which is intended to be a must-read document for the social sector that designs investments for social economy projects, as it will be decisive for the evaluation and certification of these projects.



Figure 1. Technical Standard of Labor Competence, profile (NTCL) 0020.

The EC0020 is composed of 4 elements, which describe the evaluation criteria to be satisfied, these are: performances, products, knowledge and attitudes/habits/values [7].

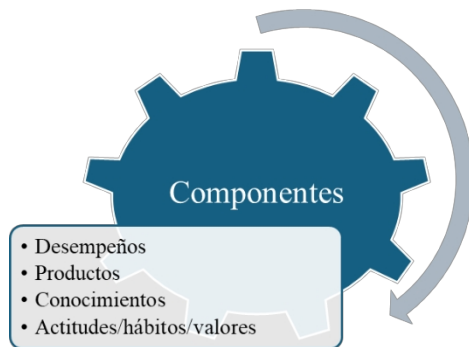


Figure 2. Components of the elements.

For a more precise understanding, the performances refer to the demonstrations of technical competence required to achieve the Competency Standard (CS). These performances include the ability to apply specific skills and relevant techniques in the context of the project, making it possible to execute the established criteria of quality and efficiency.

The products, on the other hand, are the deliverables that are generated throughout the development of the project. These products can be documents, reports, prototypes or other artifacts that evidence the progress and execution of the project goal. The quality and relevance of these products are fundamental for the evaluation of the project.

In terms of knowledge, this encompasses the terminology and technical concepts that are essential to the understanding and proper execution of the project. It is crucial that all involved understand and properly use this terminology to ensure effective communication and correct interpretation of project requirements and results.

Finally, the soft skills that are essential for the successful completion of the project are mentioned in the section on attitudes, habits and values. Adaptability, problem-solving skills, responsibility, professional ethics and the ability to work in a team are part of these skills. These non-technical competencies are essential to create a collaborative and effective work environment, allowing the project to be carried out efficiently and effectively.

Methods

The EC0020 methodology consists of the following [8]:
-Integration of the work team formed by professionals in investment and social programs, responsible and affiliated to the OSSE.

- Exposure of EC0020 to OSSE members.
- Creation of the initial draft of the investment (project) based on CONOCER's EC0020.
- Project evaluation using the instruments designed by CONOCER.
- Verification and closure of the findings to give way to the last verification of the project.
- Generation of the latest version in printed format of the project intended for investment.

Regarding the creation of the draft, which is the crucial component of the process of creating the investment project, it consists of fully complying with what is established by the EC, since the evaluation is where it is specified whether the proposal complies with the specifications of the EC. The project leader uses the collation and observation documents in accordance with the quality statutes presented in the EC0020 of CONOCER, which are called "Formulation of the design of investment projects in the rural sector".

DISCUSSION AND ANALYSIS OF RESULTS

Element 1 of EC0020: Knowing the situation of the project and its investment environment

- Diagnosis to identify the current situation and the environment: The main problems to be solved for the construction of the investment proposal are recognized with the participation the OSSE representatives, defining the mission and vision.
- Identification and completion of the Internal Factor Evaluation Matrix (IFEM), i.e., both strengths and weaknesses.
- Preparation of the External Factor Evaluation Matrix (MEFE), considering the opportunities and threats of the proposal.
- Use of the competitive profile format.
- In order to organize the important maneuvers to achieve the diagnosis, the project created in this initial phase is presented to the OSSE.

Element 2 of EC0020: Delimiting the scenarios for investing in rural projects

A strategic diagnosis is made for the rural project in which the investment will be made: The most relevant aspects were identified through the elaboration of the SWOT study.

Table 1. SWOT analysis.

Key Internal Factors
Strengths
Build your own 3D printers
Business knowledge (work experience)
It has its own premises
Prototypes can be made
Weaknesses
Lack of investment capital
It remains to be known what the demand is

Ignorance of customer search
Ignorance of advertising forms
Slowness to undertake
Key External Factors
Opportunities
Creates self-employment
Healthy work culture
Not much competition
To be able to negotiate with maquiladoras
Create customized parts
Threats / risks
Excessive legal regulation
Emergence of new technologies
Nearby businesses
Poor public relations

In the economic, social, technological, legal, etc. spheres, both threats and opportunities are identified. The diagnosis of strengths and weaknesses is validated, representing those areas of opportunity that should be taken advantage of to strengthen the plan and, of course, the organization that will implement it, as well as those that should be changed or mitigated to minimize the dangers and disappointments.

Results obtained from the application of the diagnostic instruments

Based on this analysis of the environment (using the MEFI, MEFE, competitive profiles and SWOT matrices), OSSE determines and classifies the subsequent maneuvers according to their relevance:

- To achieve the presentation of current products or services in Juarez, located in the north of the State of Chihuahua (market development) [9] and [10].
- Set as a goal to participate to a greater extent in the current product market by adding marketing tactics (Market Penetration).
- Seeking to increase sales by actively listening to customers by improving the coverage of their needs with the products offered, in particular, developing strategies that favor perceptions of hygiene, availability and price (Product Development).
- Receive financial assistance from government institutions (INAES).

Situation of the OSSE constituency (current scenario)

The people who make up this large work group live in Juarez, work as teachers, work in maquiladoras and are also students, as well as self-employed workers. Their average personal income is around \$750.00 according to CONASAMI [11].

In addition, the manufacturing resources are largely concentrated in the area of the

maquiladoras, stores and schools, being a great opportunity for progress. We have our own premises and our own machines and tools, which are necessary to face the new commitments that may arise in this area.

The growth in the manufacture of 3D printed products is increasing due to the way it replacement needs for certain products that are not easily and cheaply available on the market.

This is possible because parts or products manufactured in 3D printing have a lower cost than conventional products [12].

The purpose is to increase sales of 3D printing products through well-established strategies that provide large consumers with: price, quality and product availability by optimizing resources and inputs.

Trend scenario

The 3% increase in the target population has a great effectiveness in the use of 3D printing. With defined strategies to provide innovative products, is a 5% increase in annual sales: Immediate availability, price competitiveness and excellent quality.

Scenario of the desirable situation

The idea of the project "Sale and manufacture of 3D prints" arises when presented as an initiative of the representatives of the group to generate job opportunities, in addition to the progressive economic need to obtain personal and family income, those seeking such opportunities to achieve that investment that can ensure social welfare.

To start this project, a total of 85,000.00 pesos to start producing and selling 3D prints. It is required to start with a total of 3,150 pieces in the first year. Prices are contemplated between \$2.00 to \$390.00 pesos.

Element 3 of EC0020: Design investment projects for rural enterprises

Product Features and Services

3D printing is known as additive manufacturing, since it is performed through processes that print the part by adding materials layer by layer, in cross sections for the 3D model, which is why products will be offered with materials according to technical specifications of the materials to different suppliers that meet the specifications of the order [13]. Quality control checks that the materials meet the requirements of the order. Likewise, there is a

inspection during manufacturing development, which is to continuously test and evaluate the performance of the part. Finally, a post-printing control is performed in which the parts are put to resistance and measurement controls to guarantee their quality.

Consumer analysis of the product

Demand: The 3D printing products will be marketed in Ciudad Juarez, which has 1'592,942 inhabitants [9], being an important market to commercialize, since the number of prospective clients has increased as they have shown their interest in this idea, even before it has materialized, since the clients are mainly maquiladoras, schools, businesses and individuals.

The strategic sales locations are located in the maquiladoras and stores, and retail sales can be home-delivered or at the company's commercial premises. Wholesale sales can be delivered to the customer's home if requested by the customer.

Table 2. Buyers.

Product	Key rings, caricatures	Prototypes	3D Printing specific
Main buyers	Individuals	Maquiladoras	Schools
Location	Juarez City	Juarez City	Juarez City
Volume	3206	4970	270
Periodicity	Monthly	Annual	Weekly
Revenues for the project	5%	30%	40%
Document supporting the sale	Letter-purchase	Letter-purchase	Letter-purchase
Terms of payment	Cash	Credit	Cash

The 3D Prints will be sold and delivered after having been paid, except in the case of the existence of a credit agreement for the purchase and sale. Potential customers are equivalent to 10% of the population of Ciudad Juarez, where there is a large number of buyers who demand this type products on a daily basis, since 3D printing is an important economic activity in this part of the state.

The most important customers are about 1 % of the population that in some months of the year demand 3D prints for different buyer needs (Table 2).

On the other hand, the interest in 3D printing in families and with it the increase in demand for such purposes, is increasing, so it is estimated that the sale to the general public will take place every week.

On the other hand, on the economic side, it is considered that profits will be invested in the first two years of life to grow the business.

Analysis of direct competition

- a) **Main competitors:** It is considered that there are major competitors of the product to be marketed (3D printing) and the competition that could have greater similarity for selling products in 3D printing, can be seen in Table 3.

Table 3. Competitors.

Name	Border Proto	3D MODS
Product	Hook/gear	Hook/ Gear
Sales price	200	350
Terms and conditions of sale	Cash	Credit system
Other services	Home delivery service	Home delivery service
Quality	High	High

- b) **Advantages over its competitors:** It has personalized service, staff with expertise in printing area and technical skills in 3D printing. In addition, it has the best technology and innovations.

Study of existing and proposed prices:

At present, there is no direct competition. In the region in 3D printing. To carry out the price analysis in the products that are handled, we consider the products requested by customers; it is necessary to first consider: size of the piece, the weight of the piece, the time in minutes it takes to print the piece, the type of material that will be needed because depending on the material and its price is what will affect the direct costs as a whole. Once you have all the direct costs for each part, you add them up and get the direct cost. The price depends on all these factors and depending on the characteristics of each product.

To obtain the prices of each product, the direct costs are considered, as well as the indirect costs and the profit margin is also considered, considering that several products are handled, such as: Hook \$200.00, gear \$350.00, faces for key rings \$2.00, cartoon monkey \$140.00, nut with nut \$160.00, gear wheel \$250.00, side bridge \$130.00 and set of pieces. \$390.00. In the study of the competitors' prices, it shows that the price is very good to obtain the desired market share.

Product sales analysis:

The sale will be carried out by offering both credit and cash sales; credits will be for 30 days and

only for repeat customers. Leaving new customers only the option of cash sales. It is very important to select the tools that can help to make the company known, in this case they can be: Creation of an internet page showing the company's data and the items that can be manufactured, mission, vision, policy, services that can be provided, among others. Facebook page to attract other types of customers, stands in universities, adding a value proposition to our services and products.

It is very important to identify our potential customers, once we have contact with them we carry out a consultation about the piece they want to print, the design or prototype is made until the completion of printing of the piece or pieces.

Likewise, promotions will be designed in accordance with the current times in order to use technology within reach of the pocket in the marketing strategy.

Annual sales program (table 4): It is estimated to grow steadily and staggered monthly. Continuous production is contemplated, being the first direct sales and through the program (letter of intent from potential clients), which will be reflected in the second half of the year of the beginning of the company's activities.

Summary of projected annual sales.

Product		3D Printi ng
Unit of Measurement		Minute
Unit Price		various
Annual Units (in thousand s)	1	3150
	2	3200
	3	3400
	4	3450
	5	4700

Technical feasibility analysis

It has its own premises, quite spacious to be able to work, the premises has an extension of 800 square meters and has parking for customers.

Three 3D printing machines are contemplated. The maximum production capacity that can be achieved can be measured by the maximum number of parts produced, taking into account their weight and the minutes needed for their manufacture and the price of the materials to be used.

It even manufactures and assembles its own 3D printers, but they are for company use only, not for sale. All the electronic parts are purchased from the company's

United States (Extruders, hot bed, hotends, ramps, board, etc.)

Four different areas are contemplated for the study: Purchasing Area, Production Area, Design and Printing Area and finally Quality Control Area.

- Purchasing area. - Materials are purchased according to technical specifications from different suppliers at our convenience. The purchase order will be used to keep track of the orders.
- Manufacturing area. - They are in charge of the elaboration of the parts in the 3D printers.
- Design and printing area. - Responsible for the preparation and design, modeling, error correction and technical advice to customers. Responsible for printing the models as required, respecting the customer's request for approval.
- Quality control area. - Inspection of materials that meet order specifications. Inspection throughout the manufacturing process to constantly test and evaluate the performance of the part. Finally, a control is carried out after printing where the parts are subjected to tests of: strength, curing, scale and rigidity.

With these areas it is projected to have a production capacity of 3150 3D printed parts per year, with an equipment investment cost of \$85,000.00. This information of the production plan is shown in Table 5.

Table 5. Production program

Volume of 3D prints	
Year 1	3,150
Year 2	3,200
Year 3	3,400
Year 4	3,450
Year 5	4,700

Administrative and organizational study of the project For the coordination and administrative improvement of the project, job descriptions are considered for the members of this group, who are valued as trustworthy workers [14].

The legal representative or manager is the decision-maker, trying to sustain the business in optimal conditions and achieve the best in sales.

The work group has five people with different positions each for the best performance of the work: Legal representative or manager, general administrator, two technicians and sales representative.

The financial study of the project specifies the OSSE's investment : fixed investment, deferred investment and required working capital, financial leverage, cash flows, calculation of expenses and income, and the income statement of the company's members.

Element 4 of EC0020: Feasibility of the project proposal for the rural enterprise

In order to carry out a financial study and to be able to measure the profitability of 3D printing, the following indicators are considered: Net Present Value (NPV) and Internal Rate of Return (IRR).

Table 6. Risks, impacts and strategies

Factor / Extern al force	Risk / Threat	Probable impact	Strategy
Economic	Unemployment	Decrease in sales	To make significant efforts to market - technology
	High interest (loans)	No financing Propose good products in Price - Hygiene - Availability miento	Financial support from INAES
Social, cultural, demographic and environmental	Environmental laws	Problems IP start-up	Propose good products in terms of Price - Hygiene - Availability
	Marginalized area	Decrease in sales	To achieve strategies with excellent marketing
Technological	High cost of equipment and training	Digital divide	Obtaining financial support from INAES

Previously, this resulted in an IRR rate of 33.5 % with a positive relationship. Cost Benefit (C/B) measures of 1.02 are established, with which it is decided to make decisions. The project presents a financial feasibility and is approved as feasible by the OSSE.

In relation to the analysis of risks or threats, an analysis of the probable dangers of the project is carried out, as well as their collision in the development of the project. Likewise, alternatives and tactics are established to reduce the risks. According to Table 6 of Table 6.

The group's analysis pursues the creation of various promotional channels.

- 1) To achieve excellent marketing strategies.
- 2) Apply for and obtain financial support from INAES and
- 3) Availability of products with quality and good price.

Project sustainability analysis

The environmental impact assessment at sustainability, but for a project to be sustainable. It is also necessary to consider economic efficiency, economic performance and social benefit for the equitable benefit of natural resources. There is no problem in this regard in terms of regulations and the environment, since no polluting materials that could harm the environment are handled and work is carried out in a very large area where the distance from neighbors is more 300 meters.

Family financial planning is an essential strategy for ensuring the long-term financial stability and well-being of the family. Since the majority of the family is involved in managing finances and working together toward common financial goals, a collaborative environment is established that can lead to a sound and secure financial future.

We work taking care of the intellectual property of the work we do, as well as respecting the Industrial Property Law.

Precisely, the implementation of the project generates positive impacts in the area, economic and social improvement.

Future work

This work suggests the formulation of a detailed guide for the development of investment projects in Juarez, ranging from the initial diagnosis to the evaluation of financial viability, with special emphasis on the analysis of performance and sustainability indicators. This guide could be applied in various contexts, being presented in congresses and colloquiums for validation and continuous improvement.

It is recommended that longitudinal studies be carried out to assess the long-term social and economic impact of the project, as well as to explore new market opportunities and derivative products that contribute to the sustainability and growth of the social and solidarity sector of the economy.

CONCLUSIONS

The purpose of this work was to provide support in the creation, development and evaluation of an investment project for a Social Sector of the Economy Organization (OSSE) in the social economy located in Juarez. It is based on the Competency Standard

EC0020 of the Consejo Nacional de Normalización y Competencias Laborales (CONOCER) This objective has been satisfactorily met.

The project has demonstrated its financial and operational viability, with an Internal Rate of Return (IRR) of 33.5%.

% and a Cost-Benefit (C/B) ratio of 1.02, which confirms its potential to generate significant benefits for small entrepreneurs and help the economic and social development of the region.

3D printed products represent a great innovation for this sector, since they respond to the growing demand for sustainable products.

During the progress of the project, the four elements of Competency Standard EC0020 were carried out and evaluated in detail, which was fundamental to support the development of 3D printed parts, in the realization and consolidation of their project. The SWOT analysis allowed identifying key strategies for commercialization and risk mitigation, including market penetration and development, by obtaining governmental economic support. In addition, specific plans were outlined for the manufacture and commercialization of the 3D prints, ensuring their competitiveness and acceptance in the local market.

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