Recibido: 29/03/2024 | Aceptado: 12/06/2024 | Publicado: 09/07/2024

Analysis of eco-innovation in a Mexican textile company

Análisis de la ecoinnovación en una empresa textil mexicana

https://doi.org/10.21803/adgnosis.13.13.721

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How to cite this article:
Ramírez; H. y Torres; A. (2024). Análisis de la ecoinnovación en una empresa textil mexicana. *Ad-gnosis, 13*(13). *e#721. https://doi.org/10.21803/adgnosis.13.13.721*

RESEARCH ARTICLE

Abstract

Introduction: The current production-consumption model is unsustainable, fast fashion (fast fashion) is a system of excessive production-consumption in a reduced lapse; **Objective:** to analyze the eco-innovation process in a company of the Mexican textile industry in order to identify its impacts, advantages and disadvantages; **Methodology:** it is qualitative from the review of specialized bibliography, documentary and the elaboration of interviews; **Results:** the company studied is eco-innovative since it recycles 5 tons of PET and 2.5 tons of cotton per year, reduces CO2 emissions by 75%, saves 1,600 liters of water per T-shirt and cooperates with reforestation by planting 30,000 trees; the Triqui embroidery craftswomen of Oaxaca receive economic resources and direct and indirect jobs are created; **Conclusion:** public policies of the Mexican state and the change of the economic model on consumption are lacking, a legal framework should be created to encourage the promotion of eco-innovation of companies and organizations. In addition to a necessary change in the lifestyle of society and its thoughts.

Keywords: *Company; Textile industry; Environment; Natural resources.*

Resumen

Introducción: El modelo de producción-consumo actual es insostenible, el fast fashion (moda rápida) es un sistema de producción-consumo excesivo en un lapso reducido; **Objetivo:** analizar el proceso de ecoinnovación en una empresa de la industria textil mexicana con el fin de identificar sus impactos, ventajas y desventajas; **Metodología:** es cualitativa a partir de la revisión de bibliografía especializada, documental y la elaboración de entrevistas; **Resultados:** la empresa estudiada es ecoinnovadora ya que recicla 5 toneladas de PET y 2.5 de algodón al año, reduce un 75% las emisiones de CO2, por cada playera ahorra 1600 lts de agua y coopera con la reforestación con la siembra de 30 mil árboles; las artesanas bordadoras triquis de Oaxaca reciben recursos económicos y se crean empleos directos e indirectos; **Conclusión:** faltan políticas públicas del estado mexicano y el cambio del modelo económico sobre consumo, se debe crear un marco legal que propicie el fomento de la ecoinnovación de las empresas y de las organizaciones. Además de un cambio necesario en el estilo de vida de la sociedad y sus pensamientos.

Keywords: *Empresa; Industria textil; Medio ambiente; Recursos naturales.*

Códigos JEL: L67, O30, O32, Q56

Introduction

The environmental crisis is manifested by global warming, pollution, deforestation and the emission of greenhouse gases, and so on. To solve these global problems it is necessary to protect and care for the planet's environment, implement sustainability studies, innovation and eco-innovation to conserve natural resources and sustainable local development. For this reason, innovative projects are implemented with a sustainable approach that contribute to the conservation of natural resources and the reduction of water, air and soil pollution, as well as to new ways of creating value and addressing environmental problems. According to the United Nations (UN, 2021), the current lifestyle is unsustainable because there is a persistently high demand for natural resources to meet needs for food, water, housing, infrastructure and clothing, among others. Due to this, the various industries have developed excessive processes for the production of goods, leaving aside harmony with nature, proof of which is the recognition of the textile industry as the second most polluting industry, after the oil industry (Coloma, 2020).

Consequently, fast fashion is fast fashion and consists of a system of excessive production and consumption in a short period of time, with synthetic materials, low quality clothing and low shelf life. Because of this, companies and countries must create innovative and sustainable initiatives to reverse the ecological damage, satisfy the needs and contribute to the change of consumption patterns. For this reason, this paper studies a Mexican company in the textile sector that implemented a sustainable strategy, a soil reforestation policy and the production of organic clothing with PET materials and used clothing, without the intention of generalizing the Mexican reality.

The question guiding this research is: How does eco-innovation materialize in companies? The objective of the work is to analyze the eco-innovation process in a Mexican textile company in order to identify its impacts, advantages and disadvantages. The methodology is qualitative and explanatory based on statistical information, theoretical reviews, institutional reports and interviews with members of the company in question, which makes the research not representative but illustrative of a particular company.

The paper is structured in four parts: the first deals with the theoretical references on sustainability and eco-innovation; the second part analyzes the context of the textile industry; the third part develops the methodology used for this research; and the fourth part presents the results and discussion of the case study presenting the environmental, economic and social impacts of the innovation; the advantages and disadvantages of the production-consumption system from the sustainable approach.

This paper contributes to the study of eco-innovation in practice and to the discussion on the economic, social and environmental dimensions of eco-innovation, concluding that the Mexican company is eco-innovative and sustainable from the economic, social and environmental dimensions, which contributes to the conservation of natural resources with recycling practices and the promotion of social inclusion from a network model. However, the company still has areas of

opportunity to make a fair payment for the work of Mexican craftswomen and above all that this type of project does not change consumption habits, but rather continues to encourage excessive consumption with an ecological approach.

Theoretical framework

Sustainability

The environmental crisis and its effects have increased the concern of scientists, academics and politicians for concrete solutions to halt the crisis. This concern resulted in the international community meeting at different historical moments to develop concrete actions to stop the crisis, such as the United Nations Conference on the Human Environment (UNCED) in June 1972, which resulted in the United Nations Environment Program. In recent decades, the Millennium Declaration was signed in 2000, which included 8 goals to be achieved by 2015, known as the Millennium Development Goals (MDGs), one of which, number 7, focused on ensuring environmental sustainability.

Recently, in 2015, the international community signed the 2030 Agenda for Sustainable Development, which includes 17 goals, known as Sustainable Development Goals (SDGs) that broaden its scope of intervention, seeking, among other things, to achieve gender equality, clean water, affordable and non-polluting energy, decent work, reduction of inequalities, sustainable cities, responsible production and consumption, and protection of ecosystems.

In this context, sustainability becomes important and is understood as a "process with the capacity to produce indefinitely at a rate in which it does not exhaust the resources it uses and needs to function and does not produce more pollutants than its environment can absorb" (Calvente, 2007, p. 2). (Calvente, 2007, p. 2). However, authors such as Carrillo et al. (2019) emphasize that sustainability not only addresses environmental issues, but also the recovery of the social fabric and economic viability. In this sense, sustainable development becomes an efficient way to reverse environmental damage, social transformation and a new economic system of responsible production and consumption (Brundtland, 1987, p.23).

Sustainable development, according to Carrillo et al. (2019), "is presented as a multidimensional proposal that incorporates the economic, environmental, social and cultural vision to address problems of inequality, unemployment, environmental and technological impacts, public spending and social participation, among others" (p. 12-13).

Because of this, sustainability is forcing organizations to change their production systems; companies commonly interpret sustainability as an effort of human labor and nature, thus, some companies seek to create a sustainable culture. Portales et al. (2009) propose a model of corporate sustainability that takes into account five dimensions of sustainability.

sions: company management, competitiveness, impacts, relations and communication with stakeholders.

Fletcher (2012) posits that:

> a reconfiguration in this field and in the fashion system. He reflects on the transformations that the textile sector should undergo, in relation to the entire life cycle of the product (from the choice of the fiber until it falls into disuse), and states that "...something as apparently simple as choosing one fiber and not another is actually intimately related to global issues and personal values; such as whether we prefer slow and profound change instead of rapid innovations, or in what way and on what scale we think it is necessary to intervene to achieve sustainability". He further adds that "the process of sustainability forces a change in the fashion system...", so that the design practices known up to now are in check (p.4).

Ecoinnovation

Currently, the different social actors have taken actions in their respective fields of competence to reduce the impact of human activities on the environment. The State, organizations and society in general are becoming more aware of the need to implement actions to reduce environmental risks and thus achieve a desirable future for future generations, with sufficient natural resources and new green economic systems.

In May 2011, the Organization for Economic Co-operation and Development (OECD) proposed the term "green growth", which it defines as the promotion of economic growth and development in parallel with the securing of natural assets that provide the environmental resources and services necessary for social well-being. To achieve this, according to the OECD (2011), there are several sources that can be used, such as productivity, innovation, new markets, confidence and stability.

Innovation is an opportunity stimulated by specific policies and contexts of a frame of reference that give way to new ways of creating value and addressing environmental problems. This is eco-innovation. Theories on eco-innovation have gained importance in business activi- ty, this term can be traced back to or has its origins in the concept of inter- mediated technology or appropriate technology introduced in 1960 by Schumacher which emphasizes on achieving minimum consumption of natural resources and minimum degradation of the environment (Hazarika and Zhang, 2019).

Eco-innovation arises from the categorization of the environmental debate that has evolved and that starts with the technocentric perspective and moves towards the ecocentric. According to Haza- rika and Zhang (2019) technocentrism focuses on technological development that is capable of providing sustainable development and arises from neoclassical economics that saw technology as an efficient solution to overcome environmental deficiencies and as a tool for the modernization of companies without affecting the environment.

For its part ecocentrism and according to Hazarika and Zhang (2019):

> It reflects on the propositions of correcting imbalances between man and nature by improving knowledge and information. These debates led to the emergence of two branches of thought: environmental economics focusing on environmental externalities and ecological economics emphasizing the relationship between economic development and natural con- servation.(p.66)

Thus, studies on eco-innovation have evolved from a technological perspective to one of the relationship between man and nature, reaching the conceptualization, but it is still a term that can be debated and enriched. The evolution of the concept of eco-innovation has been such that it started from a technological perspective as the basis for the profitability and development of companies and with the studies that have been carried out it is now conceived as a political, cultural and social perspective, therefore "eco-innovations from the local level have another meaning, as a means for economic growth, social cohesion and the preservation of natural resources, and not with a merely lucrative purpose" (Carrillo and Ríos, 2020, p. 223). With the evolution of studies and perspectives on environmental care, the concept of eco-innovation has been consolidated and is presented in Table 1 from the perspective of various authors.

Table 1.
Evolution of the eco-innovation concept

Author	Concept
European Commission 2011, p. 3.	Any form of innovation that pursues a significant and demonstrable advance towards the goal of sustainable development, by reducing negative impacts on the environment, by improving resilience to environmental pressures, or by achieving more efficient and responsible use of natural resources.
Oliver-Solá, Farreny and Cormenzana, 2017, p. 10.	It is an approach that aims to respond to environmental challenges and take advantage of business opportunities, incorporating changes throughout the company, from the business model and business strategy to the design of products, services and production processes, considering the entire value chain.
UNEP, 2017, p.15.	It is a process that, acting at the level of a company's value generation chain, can program a systemic change in the company. It can make a considerable contribution to sustainable development in the market and society.
Gente and Pattanaro, 2019, p. 96.	It is any form of innovation that results in or aims at significant and demonstrable progress towards the goal of sustainable development, by reducing impacts on the environment, improving resilience to environmental pressures, or achieving more efficient improvement and responsible use of natural resources.
Carrillo and Ríos, 2020, p. 222.	It is also positioned as a phenomenon that goes against the dominant trend of public policies, in an act of social resistance and arises in a scenario where the intervention of local power groups framed in formal and informal institutions that act to the detriment of the progress of the organizations themselves is present.

Note: prepared by the authors based on information from related authors

However, the idea of promoting eco-innovation from a business-lucrative point of view persists, leaving aside its contributions to social welfare. In this sense, authors such as Hazarika and Zhang (2019) retain the idea that eco-innovations must be new technological structures different from the existing ones, thus the authors propose in a disruptive way the introduction of "renewable energies, closed-loop systems or open cycles, which challenge the con-

The company is a complex and dynamic system influenced by various internal and external factors" (p.65).

For their part Oliver-Solá et al. (2017) establish certain criteria for the development of eco-innovations in companies, such as:

> the ability to recognize the importance of sustainability challenges for their sector in the long term, to take action to turn these challenges into opportunities, the need for leadership, an open and responsive corporate culture, and to adopt a more holistic view of their business under a life-cycle approach (p. 12).

Although these criteria or requirements are based on a business vision, they can be adjusted to the reality of rural organizations whose common goal is the well-being and development of their localities.

In order for companies or organizations to develop eco-innovations it is necessary to find internal and external motivations to the organization, these motivations are given by the demand of customers to new environmentally responsible markets, the need for greater efficiency and optimization of resources for economic savings, greater competitiveness thanks to innovations and for a better positioning in the market.

The concept of eco-innovation is strongly related to innovation and sustainability, in that sense and according to Huber quoted by Hazarika and Zhang (2019) eco-innovations can be radical or incremental, the latter can considerably reduce the resources used in the processes of a company, but the priority must be a radical change that modifies the industrial metabolism in order to achieve economic growth and sustainability, from a local perspective.

According to Carrillo and Villavicencio (2020):

> The concept of eco-innovation is relevant because it refers to the adoption of innovative technologies, processes, products or services in a defined geographical space, from an environmental perspective, whose motivations stem from creativity or scientific progress, but also from the need to solve immediate problems of the population on a massive or local scale (p.18).

In order to achieve local problem solving, collaboration between sectors is required and value generation chains offer broader forms of eco-innovation, which can lead to the transformation of consumption and production systems, but it also requires public policies and state regulations, a creation of environmental culture, the promotion of corporate responsibility and the modification of consumption patterns, all of which are possible with eco-innovation (UNEP, 2017).

> Local or grassroots innovations have gained importance as they are those that are able to save the environment.

tisfying the immediate needs of marginalized communities while maintaining the security of natural resources. Local innovations are carried out not by large enterprises but by those members of the communities who lack formal education, but at the same time possess sufficient traditional and technological knowledge to live and work in miserable environments (Pansera and Sarkar, 2016).

Implementing grassroots innovations not only satisfies the needs of consumers, but also has an impact on the standard of living of the inhabitants of innovative communities by making them more productive, sustainable and reducing poverty levels (Pansera and Sarkar, 2016). For grassroots innovations to emerge, an essential condition is required, scarcity, i.e., there must be a problem or a need that must be addressed, according to Pansera and Sarkar (2016) "in conditions of scarcity the human mind is stimulated to think outside the box" (p.6) this results in low cost, effective and efficient solutions in the use of resources.

Contextual framework

In the current context it is unfeasible to make any analysis without the "pandemic" variable, therefore, this section seeks to briefly put the textile industry in context by analyzing its impact due to the coronavirus pandemic, some data on imports and exports of the sector at a global and national level and of formal jobs in the textile-garment industry in Mexico, as well as the environmental impact of the textile industry in the world.

Table 2 shows the impacts of the pandemic by economic activity according to reports of the Economic Commission for Latin America and the Caribbean (2020), so that it can be seen that the fashion (textile) industry is one of the main industries strongly affected by the arrival of COVID-19.

Table 2.
Pandemic Impacts by Economic Activity

Fort	Significant	Moderate
Tourism	Mining	Primary activities
Traditional cultural industry	Electricity, gas and water	Domestic food market
Trade	Construction	Medical supplies
Repair of assets	Business Services	Medications
Hotels and restaurants	Financial activities	Telecommunications
Transportati	Beverag	Packaging
on Fashion	es	
Automobiles	Furnitur	
	e	
	Chemical industry	
	Electronics	

*Note: (*ECLAC, 2020).

The textile industry worldwide and nationally.

Currently the textile industry is one of the main pillars of the world economy mainly for developing countries, the textile industry belongs to one of the industries with more jobs 640 million people in 2019, likewise re-presents 2.5% of world trade in goods and 3.3% of the world trade of manu- invoices within the textile industry, one of the regions with the highest exports is Asia with 4.3%, of the regions with the highest textile imports are Africa with .8% followed by Eastern Europe with 5.8% which makes it a strong economy for the world (See table 3) (INEGI, 2020).

Table 3.
Textile imports and exports in the world

Textiles in the total trade of goods	Exports (%)	Imports (%)	Textiles in the total trade of manufactures	Exports (%)	Imports (%)
World	2.5	2.5	World	3.3	3.3
North America	1.3	1.4	North America	1.7	1.8
Latin America	1.2	3.3	Latin America	1.9	4.3
Western Europe	2.3	2.1	Western Europe	2.8	2.7
Europe C./W., Baltic States, CIS	1.8	4.3	Europe C./W., Baltic States, CIS	3.3	5.8
Africa	1.0	5.7	Africa	4.1	8.0
Middle East	0.8	3.9	Middle East	3.7	5.2
Asia	4.3	3.2	Asia	5.2	4.6
Australia, Japan and New Zealand	1.4	1.6	Australia, Japan and New Zealand	1.7	2.6
Other Asian countries	5.7	3.9	Other Asian countries	6.8	5.3

Note: Prepared by the authors based on INEGI (2020).

The study conducted by INEGI shows the level of production of some regions in the world, as well as estimates that:

> the textile industry contributed 3.2% of the GDP of the manufacturing industries and ranked tenth among the most important manufacturing economic activities, generating a business of one trillion dollars, twice as much as the computer equipment and electronics industry, which generates around 230 billion dollars annually (National Chamber of the Textile Industry (CA-NAINTEX), 2021).

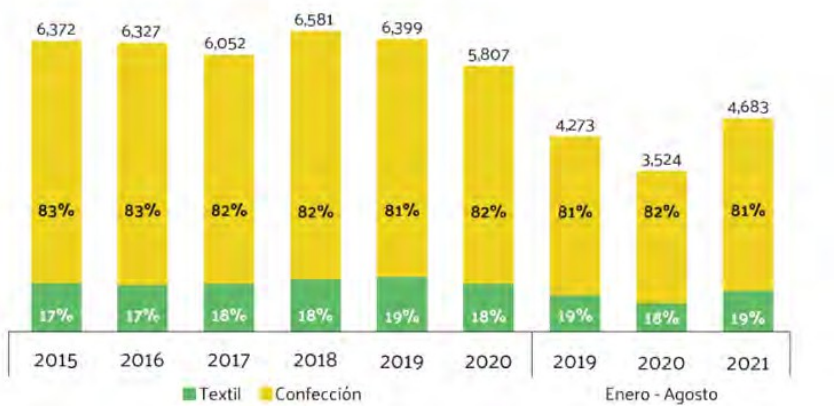
Textile industry in Mexico

Today for Mexico, the textile industry is an important pillar for the economy, according to the National Chamber of the Textile Industry (CANAINTEX), by 2021 this industry will have a significant impact on the economy.

exported 4,683 million dollars in textile and apparel products, of which 81% were apparel products and 19% textiles (CANAINTEX, 2021). For this period, a slight recovery can be observed with respect to 2019 and 2020, years affected by the COVID-19 pandemic (See Figure 1).

Figure 1.

Mexican Textile-Clothing Industry Exports



Note: Figures are presented in millions of dollars (CANAINTEX, 2021).

Figure 2 shows that in the period between January and August 2021, Mexico exported mainly to the United States, which represents 86.23% of total exports; other countries with a higher share are Nicaragua, Honduras and Guatemala.

Figure 2.

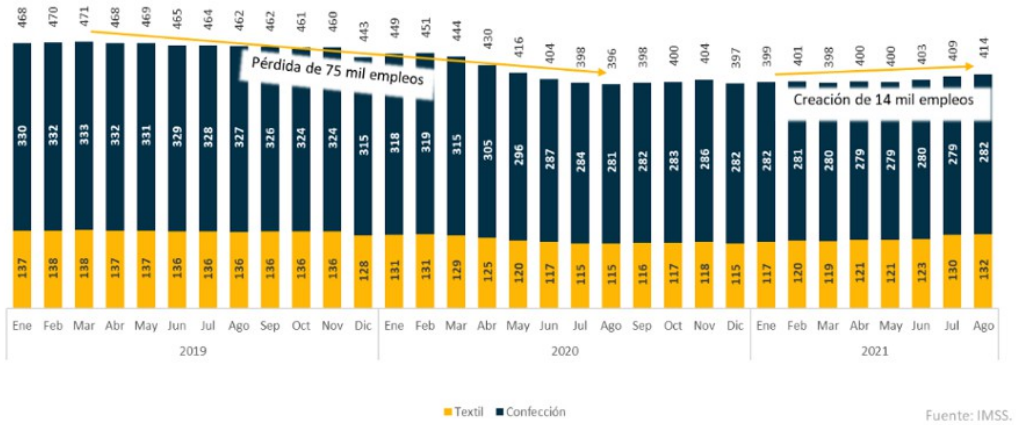
Mexican Textile-Clothing Industry Exports

Note: Own elaboration based on CANAINTEX, 2021.

According to CANAINTEX (2021) from March 2019 to August 2020 75 thousand jobs were lost in the industry and only for 2021 14 thousand jobs have been recovered, in addition to the total number of jobs in the sector belong to the garment industry (See Figure 3).

Figure 3.

Formal jobs in the textile-garment industry



Note: CANAINTEX, 2021.

Environmental impact of the textile industry worldwide

Although the textile industry is one of the companies that contributes most to the world economy, it also has a negative impact on the environment, as it is the second most polluting industry. According to Rodriguez (2020) there are two different factors that make the textile industry very polluting for the planet:

* Water pollution

One of the most significant problems and for which this industry is considered very polluting is the misuse of the natural resource of water, this industry can use up to 79 million cubic meters worldwide, only for the manufacture of a cotton shirt 2700 liters of fresh water are used, so the contamination of this resource is threatening. On the other hand, it is considered that textile production is responsible for 20% of freshwater pollution due to the manufacture of dyeing and finishing products (Rodriguez, 2020).

* Emission of gases

It is currently estimated that the textile industry is responsible for 10% of global carbon emissions, if we look at it in equivalence we can say that it is more than what the air transportation industry generates, so it is considered that the textile industry generates too many gases that contribute to the greenhouse effect, thus causing the earth's temperatures to increase, in addition to the accelerated thawing of the poles (Rodriguez, 2020).

Methodology

The methodological approach of this research is qualitative, which according to Pratt (2009) is useful to address questions of an explanatory nature that allow understanding various problems from the viewpoint of those studied in order to examine and articulate different processes, according to Vasilachis (2006) there is no single legitimate way to conduct qualitative research; however, Alvesson et al. (2022) state that there are at least four fundamental principles of this type of research; the first is that the empirical material is constructed in the process, the second refers to the primacy of interpretation, the third points out that all research has a political-ideological character and the fourth that there is no absolute truth. Therefore, it is pertinent to point out that this research is not representative at any time, but rather an approach to the particularities of an organization in order to go deeper into the subject.

The scope of the research is descriptive and explanatory, since according to Galarza (2020), it is built from a narrative construction about a phenomenon, which, in this case, is the idea of eco-innovation from the business perspective, therefore, a reality is constructed from the interaction with the members of the organization. For this purpose, the documentary review and the semi-structured interview were used as data collection tools. In the first instance, the documentary review was used to make a general description of the company under study and to obtain statistical data on the textile industry. Second, the semi-structured interview with the members of the organization in order to identify how they perceive eco-innovation from their business work.

The interviews were transcribed manually using a word processor and then the testimonies were categorized into three categories: origin of the company, operation and production process, in order to identify the advantages and disadvantages of the eco-innovative process in the company.

Results and discussion

The purpose of this section is to analyze a Mexican textile company in order to identify the impacts, advantages and disadvantages of its sustainable strategy. It begins with the origins of the environmental idea based on testimonials, then describes the company, its structure-functioning and production process and ends with the presentation of the impacts, advantages and disadvantages of sustainable innovation.

General information about the company

The textile company was founded in November 2017 located in San Luis Potosí (SLP). The main economic activity in the state of SLP is commerce and represents 56.1% of the state GDP (INEGI, 2020). The company currently has 15 employees and is managed by Jorge and Miguel; its relevant activities are to plan and control the production process of yarns, fabrics and garments.

and also markets other sustainable items (see figure 4). The company belongs to economic division 2: *processing industries, group* 24: *manufacture of garments and other articles*, fraction 242: *manufacture of garments, class II* according to the classification of the Mexican Social Security Institute (IMSS).

Figure 4.

Products offered by the company

Note: Prepared by the company.

The origin of the idea... the imperfect environmentalist

Miguel, co-founder of the company, says that since he was very young he had a fascination for nature and says that on one occasion, he was fascinated by it:

> They cut down a tree in order to paint a wall in my parents' house and I was very shocked why a tree that has been there for so many years, that gave a beautiful view in front of the dining room, had to be cut down in that way. It caused me a lot of conflict when the electricity company cut down trees all the time so that they would not hit the wires.

This shows that throughout his life he has been concerned about keeping natural spaces static, unchanged by humans, trying to keep the environment as natural as possible.

Miguel relates that he had the opportunity to live and be educated in the United States where:

> The culture is different, they are very aware of the recycling culture, the ecological culture, although they are super consumers, but there is more awareness about the environment. So when I go back to Mexico I try to keep my practices of separating garbage, responsible consumption of some organic products that do not do so much damage to your body and the environment.

This reinforces the concept of eco-innovation by Oliver-Solá et al. (2017) because the founders recognize the challenges of sustainability in Mexico and turn them into a business opportunity under a life cycle approach. The founders share this line of thinking, beliefs and values with positive impact on their environment and created the motto of being an "imperfect environmentalist" based on the philosophy of doing small tasks day by day and not harming the environment. Under this framework of beliefs and values.

In 2017 Jorge and Yamile created the company with the objectives of selling handcrafted bracelets.

made by the indigenous communities of the state of San Luis Potosi (SLP) and to plant a tree for each bracelet sold. This idea arose since these people were studying in a high school of a university institution in SLP. Thanks to the family relationship that Jorge and Miguel had, they had the opportunity to dialogue and share ideas about Jorge's project and that the management of the foundation cost time, money and work and Jorge was still a student. In November 2017 Miguel proposed to Jorge to "monetize" the foundation, through the incorporation of a company that started its activities on March 21, 2018. The company is set up as an e-commerce company and for each item sold it would plant a tree. This idea came from replicating a Canadian clothing company and Miguel was a fan of the company because it planted 10 trees for every garment sold, but its leaders did not look at the environmental impact of the textile industry because its production process was traditional.

Jorge and Miguel created a business model in 2000 known as *Buy one give one,* as their favorite Canadian brand did. Their main objective was to make everything 100% ecological and to try to generate the least negative environmental impact through their processes and products. Therefore, they set themselves the task of looking for suppliers around the world of organic cotton, recycled cotton, recycled polyester, bamboo, among other materials, always with the conviction that they were certified suppliers and committed to the environment. However, they realized that the transportation of goods from a distant continent constituted a series of negative impacts to the environment typical of global marketing such as energy consumption, fuel burning, among others. For this reason, in mid 2019 they made the decision to look for 100% Mexican suppliers making them the pioneers and the only ones to apply the Buy one give one model with the focus on reforestation, ecological products and collaboration with Mexican craftswomen dedicated to embroider a coconut shell plaque on each garment, in addition, to plant a tree for each item sold in collaboration with universities, specialists and government, becoming an *innovative social enterprise*. The company's mission is to help express interest in a greener world through our example, philosophy and products. Its vision is to be a brand that motivates young people and Mexican companies to opt for responsible consumption and to generate a positive environmental and social impact.

Current operation of the company

Currently the shareholders of the company are Jorge and Miguel, because Yamile decides in March 2021 to abandon the project started in 2017. With Yamile's departure, the shareholders invite an investor from the city of Querétaro, and Miguel says that *he is older than them and his job is to invest in pioneering projects, in addition to forecasting the future of the companies to determine their feasibility.* From the values of openness and dialogue, Jorge and Miguel make decisions and carry out the agreements of the company, but when they do not reach an agreement, they go to the investor-partner and sometimes with the entire team of the company when they are design issues.

The company has sought support from accelerators and through these they have won awards in the United States with the mission of opening a store, but from the government they have not received any support. They won the award in the Lean Startups Mexico 2018 Program, which aimed to disseminate and train the lean startup methodology for its application and monitoring in entrepreneurships.

dynamic and innovative. It consisted of a 12-week training where they obtained techniques and methods for their company.

On the other hand, they have created collaboration networks with private universities such as Tec de Monterrey, EBC, IBERO, Panamericana and Anáhuac, which in addition to sharing and receiving knowledge from them, are institutional customers of T-shirts and sweatshirts for incoming students. They are currently in talks with UNAM to establish a point of sale in the UNAM store.

In addition, Eréndira Derbez, Mexican illustrator, writer and art historian, and Regina Blandón, Mexican actress and singer, have collaborated with the foundation "El Día Después", which is a link with different civil society organizations on issues of human rights, inequality and the environment. The campaign #CruzadaPorNosotras was carried out in the month of March 2021 in favor of women, consisted of elaborating garments illustrated by Eréndira and disseminated by Regina, the profits were donated to the Red Nacional de Refugios, Mesa de Mujeres de Ciudad Juárez, Centro de Apoyo a la Mujer Margarita Magón and Centro de Derechos Humanos de las Mujeres A.C, organizations belonging to the foundation "El Día Después".

The production process: beginnings and development

Miguel says that the main idea of developing ecological products arises because the textile industry is the second most polluting, the manufacturing industry is very important, the fashion of clothing, are based on *fast-fashion* that lead consumers to the continuous purchase of clothes. This information motivated Miguel to investigate what inputs would be required to produce ecological garments, reduce the negative environmental impact, that are attractive for their simple shape and stop the rapid consumption as they are longer-lasting garments, always with the aim of producing sustainable and quality products.

Initially they started with the idea of selling simple t-shirts with the added bonus of using organic, recycled materials and with the certainty of planting a tree for each garment sold. The first step was to look for organic, recycled and quality textiles in Europe, Asia and North America. They began by importing textiles that were manufactured in Asia and sold by a supplier in Europe; however, they became aware of the economic and environmental impact of transporting the merchandise from other continents.

Thus, in 2019 they set themselves the task of looking for Mexican suppliers who work separately with PET, recycled cotton and Tencel. All this makes the company's products 100% Mexican and 100% ecological products certified by the *Global Recycled Standard* and the *Tencel* guarantee. This process consists of making garments with 100% recycled materials, 45% PET, 25% recycled cotton and 30% Tencel.

PET recycling consists of the following process: 1) collection throughout the country, 2) *sorting* of bottles by color, eliminating caps and labels, 3) *crushing* of containers into manipulable pellets, 4) *washing, disinfecting and drying*, and 5) creation of *yarn*. In turn, textile waste and the

The collected used clothing is *sorted* by color and *shredded* to obtain the cotton fiber (replacing virgin cotton), then it goes through a *carding* process for cleaning, and finally, *spinning* is used for further processing.

Tencel fabric is produced through environmentally responsible processes from natural raw materials of sustainable origin. It is a synthetic fiber fabric made from cellulose that comes from eucalyptus, is completely biodegradable and recyclable. These three yarns are mixed to obtain an organic material, which is used to manufacture fabrics for the production of ecological clothing. The production process is illustrated in Figure 5.

Figure 5.

Production process.

Note: Prepared by the company.

Production takes place through a network of suppliers/companies that work for the company, since it is a startup that does not have the capacity to produce clothing itself. The company's vision is to have its own maquila, infrastructure and capacity to concentrate the entire production process in its facilities.

This process is an innovative idea in Mexico, since this type of yarn combination was not done in our country, it is an idea replicated from European countries, therefore, it is an incremental eco-innovation in process by the design of the new process that combines organic materials, reinforcing the thesis that eco-innovation is the adoption of processes in a defined geographic space (Carrillo and Villavicencio, 2020; Hazarika and Zhang, 2019). However, the process has economic disadvantages in the profit margin, since the fast-fashion phenomenon allows margins of up to 1000% profit, in contrast for the company the margin does not reach 100%. But the intention "is not to get rich", although they have an average price of the garments on the market, their intention is always to raise awareness of responsible consumption. This company has a process of retail and wholesale sales, the first is very varied since it is carried out through digital networks, however, in the case of wholesale sales they have well identified their main customers, which are shown in Figure 6.

Figure 6.

Company's wholesale customers

Note: Prepared by the company.

Impacts, advantages and disadvantages of sustainable innovation.

The process of production and sale of organic products has direct impacts on the economic, social and environmental dimensions:

- ***Economic dimension:*** generation of direct jobs for the 15 members of the company and indirect jobs through the joint work of all the companies and artisans that collaborate with them, in addition to contributing to the GDP of their entity in the field of commerce, the main economic activity of the state.

- ***Social dimension:*** they benefit 6 Triqui craftswomen from Oaxaca, residents of SLP, belonging to the same family who embroider the coconut shell plate in the last phase of production, they are offered a payment of 1 dollar for each embroidered garment and 2.According to Miguel, working for these factories stabilizes their income and production since they have 4 orders per year, while the artisans who make the bracelets receive orders from one thousand to one thousand. In addition, part of the company's income is used to offer environmental education courses in different public and private schools in the country related to the textile industry, reforestation, the company's history and its philosophy of the imperfect environmentalist.

- ***Environmental dimension:*** direct impact on the recycling of 5 tons of PET and 2.5 tons of cotton per year, the reduction of CO2 emissions by 75% due to the use of recycled polyester in each garment, the reduction of the excessive use of insecticides, chemicals, dyes and the saving of energy.

1600 liters of water for each T-shirt, in addition to the reforestation of 30,488 trees in different parts of the Mexican territory, endorsed by the ecology secretariats of each entity, offering trees suitable for each entity and maintenance during the first three years of growth in collaboration with social service students who water and fertilize the trees, which guarantees their 85% survival.

Advantages and disadvantages of innovation

The advantages are threefold:

- The company contributes to the conservation of natural resources through recycling and soil reforestation practices, thus contributing to the environmental dimension.
- Promotes eco-innovation within the industry (textile, makeup, food, etc.) to achieve circular economy processes that reduce environmental impacts.
- It mitigates the harmful effects of the Mexican population's consumption habits and the company achieves a certain degree of growth.

The disadvantages are as follows:

- The company does not pay the Mexican artisans a fair wage for their work; here, there is an area of opportunity for it to fulfill its mission and vision. This means that the eco-innovation is not complete because it does not solve the immediate problems of the artisans, a fundamental characteristic proposed by Carrillo and Villavicencio (2020).
- The company does not solve problems or diminish the needs of German communities, but are only corporate efforts to strengthen their economic growth.
- Innovation is the result of the relationship between companies-universities-government with an economic purpose and the exploitation of a market opportunity, which according to Carrillo and Villavicencio (2020) are the result of creativity and scientific progress.
- Sustainability is just an add-on to compensate your business activity.

Conclusions

The environmental crisis caused by global warming, pollution, deforestation, greenhouse gas emissions, etc., requires global action for the protection and care of the environment, although some companies have done their own, a rapid cooperative social change is needed between companies, States and society for the conservation of the environment.

natural resources and the reduction of water, air and soil pollution. It is not enough to create innovative ways to conserve natural resources while maintaining a capitalist system of ultra-consumption; we need a new economic model that regulates and meets basic needs without falling into overconsumption, but to do so, it is necessary to change lifestyles and thinking.

This case is presented as an approach to the particular reality of a company with limitations such as access to information on the company's activities and on the various actors that collaborate in the network. However, it can be concluded that the Mexican company has innovated its production process with recycling practices for the conservation of natural resources, but it lacks a social vision oriented towards changing people's consumption habits, leaving aside harmony with nature, but it does contribute to reducing the impact of its activities on the environment and is a new form of value creation; therefore, its production process is eco-innovative.

Companies should adopt eco-efficient, holistic and eco-innovative entrepreneurship models as strategies for their development. The government should promote sustainable consumption and recycling policies, as well as a law to promote eco-innovative projects linked to localities with social deficiencies, in addition to encouraging collaboration between companies and communities to undertake environmentally friendly actions, considering the conservation of resources and the elimination of impacts that deteriorate the environment. And society must question its unsustainable lifestyle, persisting in a high demand for natural resources to satisfy needs for food, water, housing, infrastructure and clothing, among others.

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