

Sustainability in the Mexican Craft Beer Industry

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<p>The purpose of the development of this thesis is to analyze the perception and application of sustainability in the Mexican craft beer industry; all this, to find ways to improve the existing models and make them greener to go to foreign markets where sustainability is a requirement.</p> <p>Sustainability is a topic that is still growing day by day in Mexico. Having a clear panorama on how the industry perceives the green trends will lead the research to find recommendations to achieve more eco-friendly processes.</p> <p>For conducting this study, seven Mexican craft beer industries were interviewed regarding topics with opportunity areas to develop. Based on these interviews and reading some books, articles, and websites, conclusions, and key findings were made.</p> <p>The research findings show the present situation of Sustainability in Mexico, more specifically in the craft beer industry, proving that green topics are still not so developed in the country and how many improvements can be made.</p> <p>Many modifications can be made to enhance sustainability in the craft brewery industry in Mexico, adapting green models and logistics that benefit the companies, the environment, the society, and the economy.</p>	
Keywords Sustainability, craft beer, Mexico, environment, society, economy, improvements.	

Table of contents

1. Introduction.....	1
1.1. Introduction.....	1
1.2. Background	1
1.3. Project objective and research question	2
1.4. Demarcation	2
1.5. Anticipated benefits to stakeholders	3
1.6. Commissioning company introduction	4
1.7. International aspect of the thesis	4
1.8. Key concepts.....	4
2. Understanding Sustainability	5
2.1. Sustainability	5
2.2. Basic concept of Sustainability	6
2.3. Three Pillars of Sustainability.....	6
2.4. Mexican Craft Beer Industry	7
2.5. Process of the craft beer.....	9
2.6. Green logistics.....	10
2.7. Corporate Social Responsibility	11
2.8. ISO standards.....	11
2.9. Sustainability in Mexico	12
2.10. Corporate Social Responsibility in Mexico.....	13
2.11. Sustainability in Europe.....	14
2.12. Sustainable Development Goals	14
2.13. Circular economy	15
3. Research Methods.....	16
3.1. Research design.....	16
3.2. Interview design.....	16
3.3. Interview process.....	16
3.4. Other methods.....	17
4. Results	18
5. Discussion	23
5.1. Key Findings	23
5.2 Energy.....	23
5.3 Water	23

5.4 Packaging	24
5.5 Distribution	24
5.6 Waste.....	24
5.7 Perception of Sustainability in Mexican Industries	25
6. Conclusions	26
7. Implementation of the results.....	27
References	32
Appendices.....	35

1. Introduction

1.1. Introduction

Sustainability has been a recurrent topic due to recognizing the damage we are doing to the environment. Therefore, companies started to implement new strategies and processes to help or have a less impact on the world.

The craft beer industry in Mexico is now trending, and it is a concept that people like and enjoy. As a result, this industry is impacting society and the environment because of its processes.

To sum up, this industry has a tremendous future projection that it is vital to plan and design to be less harmful to the environment and benefit as much as possible.

1.2. Background

Sustainability is a concept that day to day is more known and taken into account on society, making people aware of the impact that everything we do has on the environment, making them care about changing. Industries are not the exception; therefore, companies have protocols to follow to make their processes greener. For instance, the three pillars of sustainability state that the environment, society, and economy are the basis for a company. It is essential to have a well-structured Corporate Social Responsibility policy that is also strong to help a company contribute to sustainable developments. This is crucial so the firm can ensure that its business operations are green and socially responsible. (Piecnyk & Björklund 2010, 107.)

Grupo Modelo is a Mexican beer company; it is known and one of the most relevant ones. For instance, they have a remarkable sustainable model called "Global Goals of Sustainability 2025," in which they commit to achieving greener processes. It was amazing to see how they care a lot about the environment and the society being empathic and having as a result: improvements in their company and cost reduction. This was the main reason that motivated and gave the topic to this thesis.

It is screened that for 2025 the craft beer industry will reach an impressive impact on the market's assets (Forbes 2018). Moreover, the craft beer industry in Mexico increased by 70%, and that is why we are projecting these numbers in the actual sector: therefore, it is crucial to start to create sustainable strategies to reach the desired results, in short, medium, and long terms, so it is suitable for going to the foreign market and accomplish national Corporate Social Responsibility standards (Expansion, 2019).

1.3. Project objective and research question

Research Question.

How can a Mexican craft beer company adapt its processes to the new sustainable protocols and trends to become socially responsible and go to foreign markets? Is sustainability a requirement? Timeframe for the thesis investigation: by the end of April 2021.

Project Objective.

Create a model for Mexican craft beer companies to become sustainable and socially responsible for fulfilling the international green protocols to go to the foreign market.

Investigative Questions.

- Q1. How is sustainability developed in Mexico?
- Q2. How is sustainability in the Mexican industry processes?
- Q3. How developed is the craft beer industry in Mexico?
- Q4. Which are the Mexican sustainability standards?
- Q5. Which are the international sustainability standards?
- Q6. How are the Mexican craft beer companies related to sustainability?

1.4. Demarcation

Even though craft beer might be fascinating worldwide and its processes, focusing on the Mexican craft beer industry is the priority.

Talking about Corporate Social Responsibility in the thesis is crucial and developing to plan and design the strategy. Still, there are four main CSR types: environmental responsibility, human rights responsibility, philanthropic responsibility, and economic responsibility.

Ecological and economic responsibility topics will be abroad because it is the opportunity areas that matter for this investigation. Even though it is the same topic, philanthropic and

human rights responsibility will not be approached because it is not a practical matter for developing this paper.

Sustainability worldwide is different; therefore, it is crucial to know how it is managed in Mexico and specifically in the industries. It is vital to identify the Mexican sustainability levels and see how growing and upgrading day by day. It can be possible to see it has decreased, increased and maybe it is a trend nowadays.

Working specifically in the craft beer companies in Mexico, since when it has been a real thing and since when it has been trending and working. Research on how the industry has been growing over the years and its projection for the future years.

Understand how the Mexican craft beer companies are working and if they are aligned with sustainable protocols to see what can be improved and what new strategies can be planned and developed. Do research for obtaining the general basis of the Mexican craft beer industries and go further with an approach that fits every company with these characteristics and can be applicable.

Giving information about the craft beer industry in Mexico is vital because it is the target in which the research and project are taking place, having statistics about it, objective data, projections in the future, and more is crucial for the investigation to be completely accurate.

1.5. Anticipated benefits to stakeholders

Greener and more socially responsible companies make them suitable for the sustainability of foreign markets, opening them opportunities in other countries. It aims to achieve these improvements to accomplish the three pillars of the company. One of them is the economy. Moreover, these improvements on the processes of the company will save them costs and reduce operation times.

Sustainability in Mexico is becoming a recurrent topic nowadays, but it still needs to be considered and improved. Creating sustainable companies can also motivate and be an example for consumers and make them emphatic with these greener trends. Contributing to these processes and help with the knowledge achieved in this degree can make this happen in the Mexican industry.

Expecting that this thesis motivates other students to make sustainability a recurrent topic to make other people notice that this is a fundamental matter. Contributing to our country and our world is in our hands, and making it happens can give a different perspective to everyone studying International Business and in general.

1.6. Commissioning company introduction

There is no commissioning company collaborating with this thesis; however, it is expected to work with several Mexican craft beer firms to gain insight into their accurate information processes. As a result, this collaboration will provide valuable information to help achieve this thesis' objective with exact data.

All Mexican craft beer companies aiming to go to the foreign market in the future, interested in green logistics, sustainability, and social responsibility, will be crucial and potential for this thesis' writing.

1.7. International aspect of the thesis

Mexican Craft beer companies are nowadays trending in Mexico and start to give a lot of positive results. Therefore, these firms may be suitable to go to foreign markets in the future. Countries have different protocols and ways to achieve sustainability, and in some of them, it is a requirement, and some laws back it up. To sum up, that is why it is essential that while they are here in Mexico, they achieve the country's green logistics and social responsibility and start to implement some of the international protocols to be admitted in those countries and succeed.

1.8. Key concepts

Sustainability – "sustainable development is the development that meets the present's needs without compromising future generations' ability to meet their own needs" (UN World Commission on Environment Development).

Green logistics –" set of sustainable policies and measures aimed at reducing the environmental impact caused by the activities of this business area" (Interlake Mecalux 2019).

Environmental impact –" An environmental impact is defined as any change to the environment, whether adverse or beneficial al, resulting from a facility's activities, products, or services" (Jordan Hanania 2020).

CRS Corporate Social Responsibility – "a concept whereby companies decide voluntarily to contribute a better society and a cleaner environment" (European Commission 2001).

ISO Standards – "a key part of our society as they ensure quality and safety in both products and services in international trade" (Approachable News Desk 2016).

2. Understanding Sustainability

2.1. Sustainability

The central concept to abroad in the thesis is sustainability to fully understand what it is, how it is related to the other key concepts, and how we will further develop it and link them.

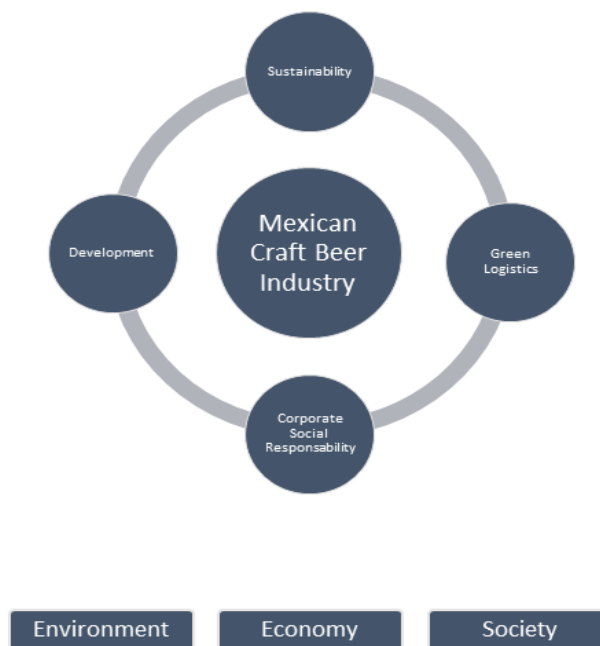


Figure 1. Mexican Craft Beer Industry

2.2. Basic concept of Sustainability

”Sustainability is the human perseveration of the environment, whether economically or socially through responsibility, management of resources, and maintenance utilizing support” (Agustiady and Badiru 2013, 1).

Sustainability's emergence as a contemporary concept and the one we know nowadays is stated in the Brundtland report in 1987. This report was given by the ex-prime minister of Norway Gro Harlem to analyze how long-term environmental proposals create strategies that helped them achieve sustainable developments for the 2000 and future years. This report first used the term sustainable development, which means “development that meets the needs of the present without compromising future generations' ability to meet their own needs” (Harlem, G. 1987).

2.3. Three Pillars of Sustainability

To have a clear panorama on the Sustainability approaches, we have the three pillars of sustainability; some people have the perception that sustainability only worries about the environment and everything related, but it is more than that. This theory points that environment, economics, and society are the foundation of sustainability and need to be covered to work successfully. In case there are only covered to of them, there are these different scenarios:

- Society + Economy = Equitable.
- Society + Environment = Bearable.
- Economy + Environment = Viable.

The environmental pillar is the most important because it includes the biosphere in which we live, making it a priority to complete society and economy pillars. Nowadays, this pillar is vital to take into account due to the hostile impact society has caused. The main goal is to analyze what things are not acceptable in society's lifestyles and the industries to design innovative and better strategies to improve world performance.

The societal pillar involves everything related to human well-being, not just temporary but also in the long-term; topics like human rights, education, health, justice, employment, and

quality in their lives ensure that they have healthy and plenty lifestyles without lacking anything to survive. Also, this pillar cares about the relationships between communities and countries being long-lasting and kind. In the business area, firms need to care about their workforce, guaranteeing quality and healthy working conditions with fair salaries and following legal and ethical protocols.

The economic pillar refers to how implementing sustainability also creates positive solutions for your company by reducing costs due to the Sustainable process implemented, innovative technologies. In some cases, governments now offer incentives and tax reductions for the businesses that have green practices. This pillar also means that firms need to be aware that they depend on natural resources, so if they stop existing, they can keep going on; that is why it is convenient for them to ensure that natural resources will continue living in the future, finding new and innovative sustainable ways to cause a less negative impact on the environment.

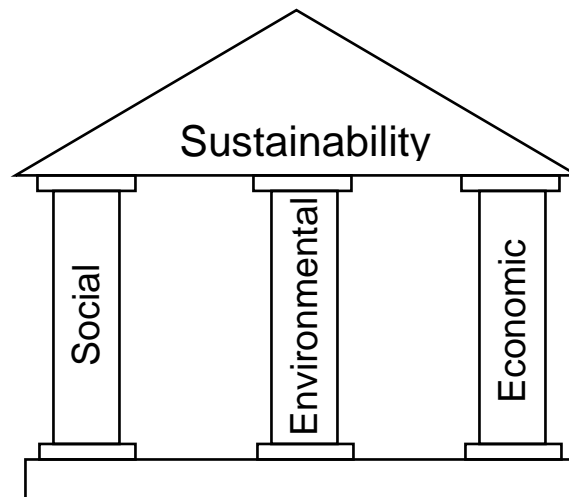


Figure 2. Three Pillars of Sustainability (Adapted from Chokshi, 2017)

2.4. Mexican Craft Beer Industry

The Mexican craft beer industry was started in early 1995 by Gustavo González; he is the creator and owner of the craft beer Cosaco; he was motivated by the American influences and trends. However, this industry is called by experts and people who enjoy beer as a "movement" that looks forward to saving and interpret the diversity, styles, and different ways of making craft beer around the world; they are trying to create a culture in which innovative processes are used having as a result beverages full of story and identity. Until 2013, the

craft beer started to have better recognition and became a trend. Therefore, in 2018, the peak of craft beer has projected more significant times in the future (Forbes, 2018).

2.5. Process of the craft beer

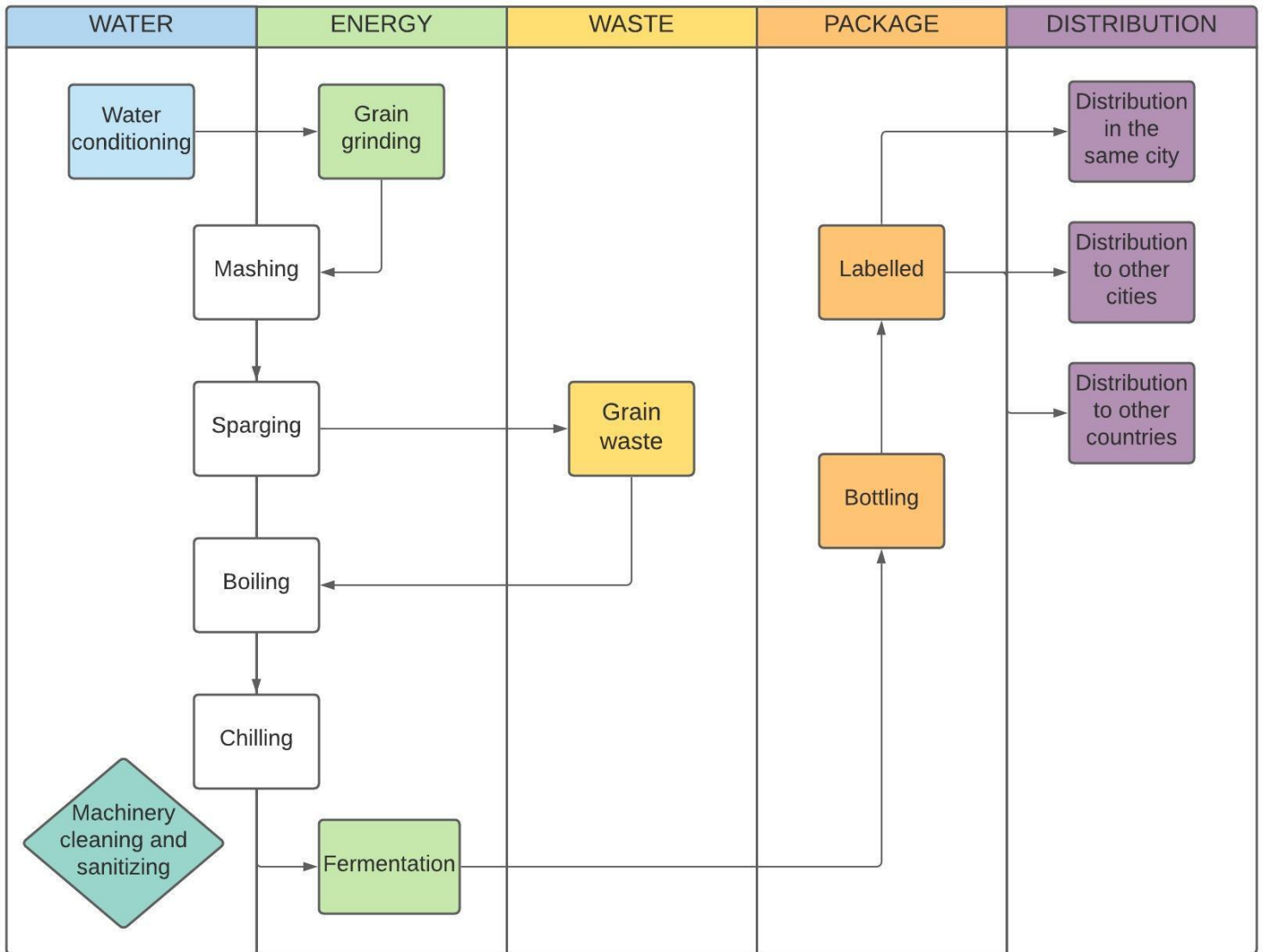


Figure 3. Craft beer process

Water conditioning is balancing the PH of the water to 5.2-5.3 to make more efficient the mashing and fermentation process; for this, calcium and magnesium are added to the water.

Grinding the grain is where the grain gets broken with an electric grind to get a better extraction in the mashing process.

The **mashing** process is raising the water temperature to 60° C and keep it there for 1 hour; then, the grain is let soaking to take out enzymes and sugar from the grain.

In the **sparging** process, the grain is rinsed to get the last extraction of enzymes and sugars; the water temperature must be 72° C.

After the sparging, the grain is **waste**.

After throwing away the grain, that liquid gets **boiled** for 60 to 90 minutes at 103° C to make the wort (the wort is the beer itself). Also, the hop is added to give flavour, smell, and bitterness.

The **chilling** process is when the wort is cooled quickly from 103° C to 21° C. This must be as fast as possible to avoid contamination and not desired flavours.

Fermentation is when the yeast is added and then let sit for ten days.

Then **packaging**, where sugar or CO₂ is added to gasify the beer before bottling in the cans, bottle, or stainless-steel barrel. Then, let it sit another two weeks, so it carbonates.

Depending on the type of beer, if it is ale, the yeast ferments at room temperature (20-25° C), the lager ferments at a low temperature (6.8° C); that is why it is essential to have a climatized room that fits in need of each style of beer.

Then, the **labeling** process before getting it distributed to the point of sale that can be in the same city, other cities, or foreign countries.

Finally, the **cleaning and sanitizing** process of the machines and place used for making the beer. Chemicals are added, but there are now edible sanitizers.

2.6. Green logistics

Green logistics is an essential topic for designing and implementing the plan we aim to achieve; how to upgrade strategies to make them efficient and with a low environmental impact. Green logistics seeks to have a less environmental impact on a company's logistics to benefit three essential pillars: economy, environment, and society.

2.7. Corporate Social Responsibility

The management of Corporate Social Responsibility is an important matter to consider; this concept states the social and environmental concerns in the company and its operations and the business with stakeholders. There are four types of CSR, but we are just focusing on two of them: environmental and economic responsibility. CSR should be interpreted as a commitment to sustainable development. Moreover, there are three different ways of classifying CSR involvement in a company. First, Value-driven CSR is shown as the core part of company culture, for example, in the firm's values. Second, performance-driven CSR is related totally to a firm's economic vision, explicitly used to have better financial performance and be competitive against others. And the stakeholder-driven CSR is a consequence of the pressures given by one or several stakeholders.

2.8. ISO standards

ISO standards' objective is to ensure the quality of offered products and services; these are essential for firms to access national and international markets and make global commerce standardized. There are approximately 19,500 international standards regarding topics such as quality management, information security management, occupational health and safety, social responsibility, country codes, energy management, risk management, environmental management and more.

For society, ISO standards are essential to ensure that the products consumed are high quality and not harmful for consuming or using.

For companies, ISO standards can reduce costs by operation's optimization, open new market's opportunities by lowering the barriers between commerce and increase the customers' satisfaction by knowing they are part of something that is guaranteed to have quality. Also, it gives companies a differentiator among their competence.

- ISO standards related to the topics developed in this paper:
- ISO 26000 social responsibility.
- ISO 45001 occupational health and safety. Ensures employee safety by reducing risks in the workplace and creating safer working conditions.
- ISO 14000 family: environmental management. This standard contributes to the Sustainable Development Goals.
 - ISO 14001 environmental management systems.

- ISO 20121 sustainable events. Making your events sustainable no matter the capacity.
- ISO 50001 energy management.
- ISO 24591 smart water management.

2.9. Sustainability in Mexico

Mexico counts with several government institutions in favor of the environment:

CONAGUA: National Water Commission

CONAFOR: National Forestry Commission

CONABIO: National Commission for the Knowledge and Use of Biodiversity.

ASEA: Security, Energy and Environment Agency

PROFEPA: Federal Attorney for Environmental Protection.

INECC: National Institute of Ecology and Climate Change.

IMTA: Mexican Institute of Water Technology.

CONANP: National Commission of Protected Natural Areas (CONANP).

Mexico is a country that has recently present concerns about society and the environment; a way to improve these areas is creating public institutions that work every day on ecology topics. In 1992, the first steps were taken, creating the Federal Attorney for Environmental Protection that is in charge of taking care of the environment and preserving it, also check out that the laws of environmental protection are being followed; the National Commission for the Knowledge and Use of Biodiversity that aims to promote and support activities that are related with Mexico's biodiversity. In 1994, the Ministry of the Environment and Natural Resources was created with the fundamental purpose of constituting a state policy of environmental protection that is taking care of how to decrease the negative impact on the environment and state the foundations for Mexico's sustainable development.

One of the main developments was in 2013 with the creation of the National Institution of Ecology and Climate Change, which has as the primary goal to design and perform research scientific and technology projects in terms of climate change, environmental protection, etcetera, and give the results to the Ministry of the Environment and Natural Resources so they can evaluate the national politics in these topics.

According to statistics of the article "Why is it important the sustainable development in Mexico?" published in The Economist and written by Ana Karen García in 2019, this is how the public budget is bounded:

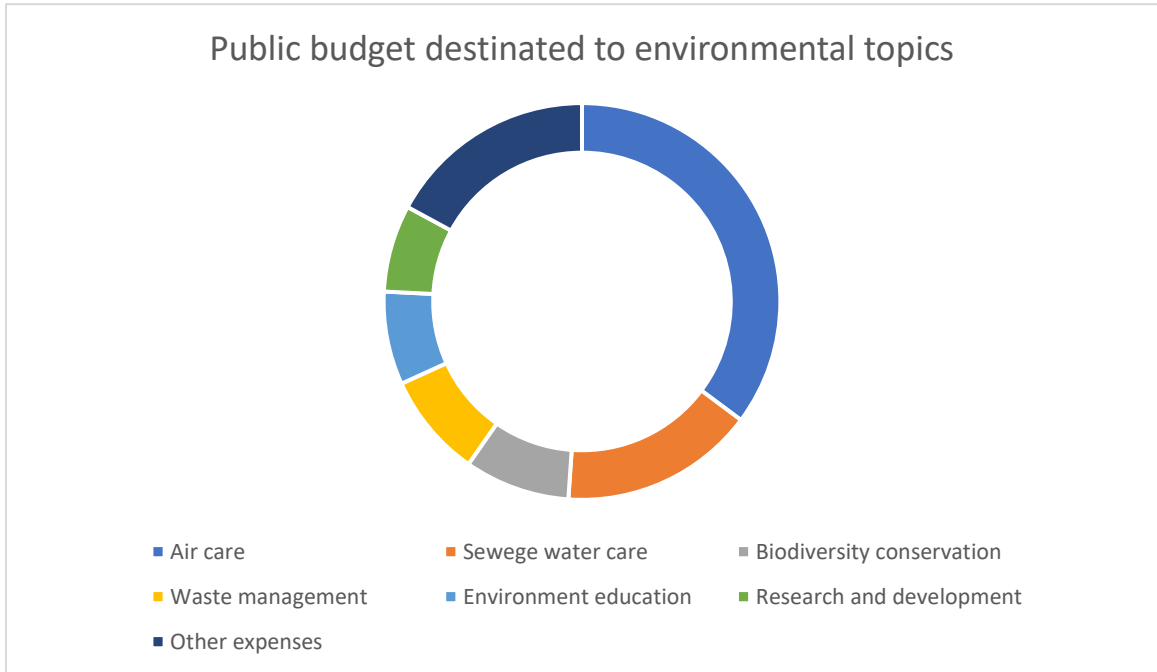


Figure 4. Public budget destined to environmental topics

2.10. Corporate Social Responsibility in Mexico

The main progress in Mexico (talking about CSR) is the creation of the Alliance for the Corporate Social Responsibility in Mexico (AliaRSE); the ALIARSE clusters 19 of the most influential organizations that back up the hard work of promoting CSR in Mexico. The Alliance aims to achieve that companies are perceived as creators of value that generate wellness, promoting benefit for everyone being socially responsible; all of these by coordinating and creating synergy between the organizations that benefit Mexico and all their members.

Organizations such as the Mexican Centre for the Philanthropy, Employers' Confederation of Mexico, Business Coordinating Council, and other organisms that are part of the the Alliance for the Corporate Social Responsibility in Mexico (AliaRSE) are active participants of the Global Compact.

2.11. Sustainability in Europe

Europe has one of the strictest environmental regulations globally; the EU governments have implemented agendas with clear medium- and long-term objectives that will lead their politics to become more sustainable. These goals try to keep, protect and improve the natural resources of the EU, having an ecological economic based on low emissions and efficient use of the resources and ensure the well-being of the EU society by protecting them of the environmental risks and factors for them.

There is an impressive effort to protect their endangered species and the flora, making sure that the water is safe to drink and use, making better the air quality, and reduce the use of chemicals that can be harmful.

Europe aims to be a sustainable continent that can create new economic opportunities and investments by innovating eco-friendly strategies to motivate and boost sustainable development worldwide.

Another critical point is that Europe wants to be the first carbon-neutral continent; consequently, the government implements some politics to the industry based on a circular economy.

2.12. Sustainable Development Goals

The EU has a long-term plan of action called the 2030 agenda for sustainable development that looks up to people, planet, and prosperity; in a more extensive panorama, they seek to improve the relations globally.

There are 17 Sustainable Development Goals:

- 1 No poverty.
- 2 Zero hunger.
- 3 Good health and well-being.
- 4 Quality education.
- 5 Gender equality.
- 6 Clean water and sanitation.
- 7 Affordable and clean energy.

- 8 Good jobs and economic growth.
- 9 Innovation and infrastructure.
- 10 Reduces inequalities.
- 11 Sustainable cities and communities.
- 12 Responsible consumption.
- 13 Climate action.
- 14 Life below water.
- 15 Life on land.
- 16 Peace, justice, and strong institutions.
- 17 Partnership for the goals.

2.13. Circular economy

Circular economy is a production and consumption model that aims to reduce, reuse, share, repair, and recycle materials as much as possible. Hence, the life cycle of the product is more prolonged and having, as a result, reduction of waste to its minimum. Raw materials are becoming more and more limited due to the demand, and some of them are specific in some countries, making them dependent on others. Also, extracting these materials has a negative impact on the environment by using more energy and generating CO2 emissions.

There must be a more clever use of the resources, and that is how the “waste hierarchy” manages that by ordering and prioritizing waste.

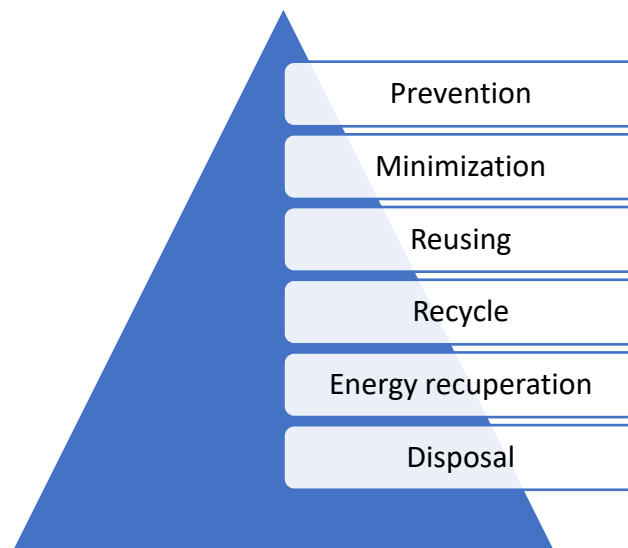


Figure 5. Waste hierarchy (adapted from Research Gate 2020)

3. Research Methods

For the development of this paper, pragmatic method research was used; by using as the primary source of research an interview that gave findings that were later transformed to quantitative data and interpreted in statistics for a better understanding.

Data triangulation was vital to have different and valuable sources that gave more concrete and accurate results.

3.1. Research design

The primary research method used is a semi-structured interview made in Webropol for a standardized format that gives a better intern control of information to have a free conversation that could provide further information.

3.2. Interview design

The interview counts with a contact form to distinguish who was the person and from which company they answered the 20 questions that cover:

- **Insight** of the company in terms of sustainability
- **Energy**. To understand what kind of energy they use in every stage.
- **Water**. Due to the importance of water in the processes, the management of it is a paramount concern.
- **Waste**. There are tons of waste in every batch of beer that is important to know how they manage it.
- **Package**. What materials are used in the packaging process? Are they recyclable?
- **Distribution**. How do they distribute in their city? In other cities? How about in other countries?

3.3. Interview process

Emailing as much craft beer companies in Mexico as possible was the first step; approximately, 80 companies were reached. Twenty of them answered: seven accepted, five rejected to be interviewed, and eight of them “accepted” but could never be reached again. Once the companies accepted, the zoom call was scheduled and attended.

The interview was conducted in Spanish with the interviewees, and then translated the results and the layout to English. The layout of the interview is shown in the appendices.

The people interviewed were part of the companies, seven out of six interviewees are the founders or CEOs of the companies, and one of the interviewees was the person in charge of the administration area of the company.

3.4. Other methods

The observation was an essential step in the research. Going to Cerveceria 4 Palos in Queretaro was vital to see a craft beer company's machinery and understand the processes better. While doing the interview, the machines were shown, which helped project everything and was deeply understood.

Multiple literary sources are being used to gather information to support the thesis, such as books, articles, and internet sources. The theoretical framework has been designed and written using these valuable sources to understand sustainability and the craft beer industry.

4. Results

For the investigation, there are five primary points to consider: water, energy, waste, package, and distribution. Seven companies were interviewed; the scoop was diverse, having small, medium, and big companies.

Here is shown the analysis of the questions that can be interpreted in graphs.

1.

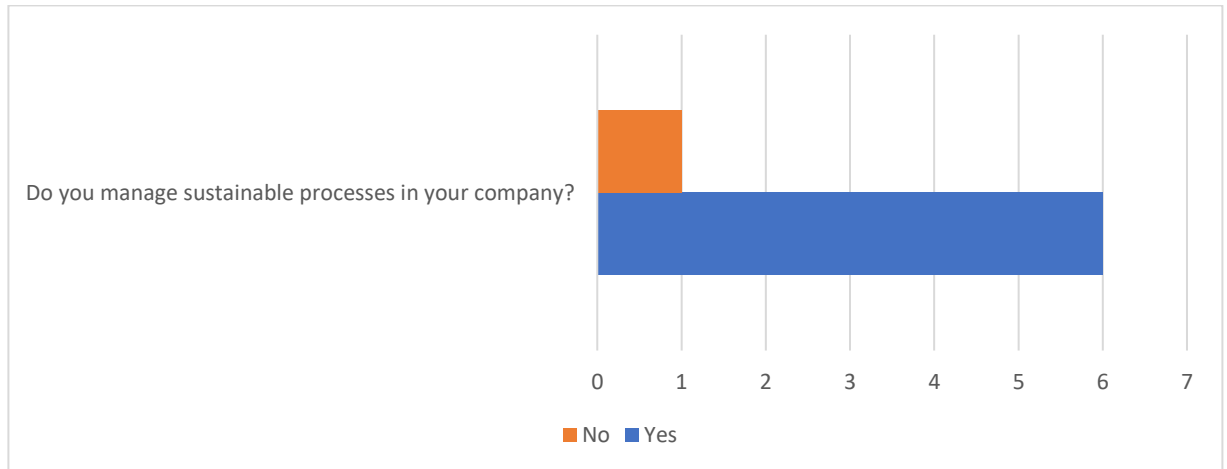


Figure 6. Results of sustainable management processes.

Six of seven companies claim that they count with sustainable processes in their company. The company that denied having sustainable processes is MiQro, when the rest of the interview questions were answered they realized they do have some green processes. This company claimed that they do not count with the time to analyze this topic and make something about it.

2.

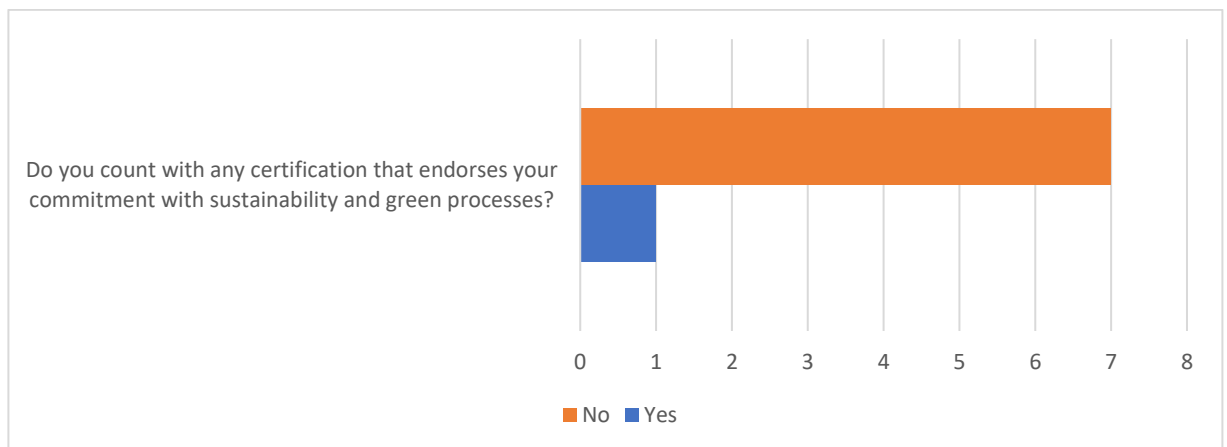


Figure 7. Results of certifications.

Six out of seven companies do not count with any certification or something that may endorse their commitment to sustainability and green topics. They think it is not necessary or have not paid attention to it.

Cerveceria Mounstruo de Agua counts with the "Brewing Innovation Award" given by the ACERMEX, which is the most representative brewing association of Mexico; this prize is given to the companies that contribute to the innovation and development of new techniques, products and/or instruments for the craft beer industry.

3.

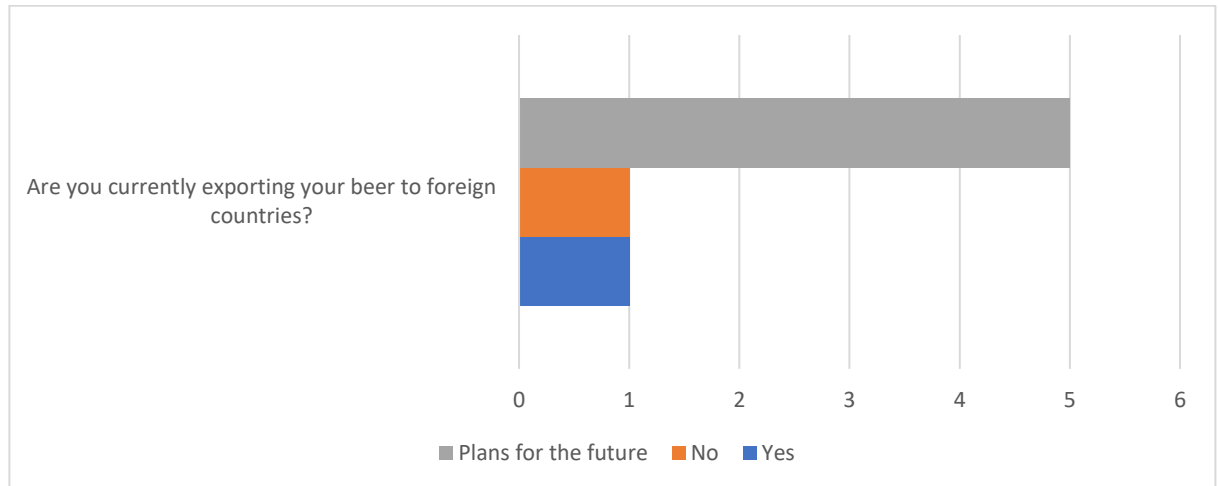


Figure 8. Results of beer exporting

Only Cerveceria de Colima is exporting to USA, France, Sweden, Peru, and has plans to export to Australia. The other companies have plans for the future to export to countries such as USA, China, and Latin American and European countries.

4.



Figure 9. Desired markets for export

The American (USA) market is the most desired because it is the closest to Mexico with a great economy, European countries claimed to be viable because of the great beer culture that exist, Latin American countries are a good option because they are in the same continent and have a similar culture than Mexican people, and Chinese market is interesting and ambitious because is a whole different culture but can be achieved.

5.

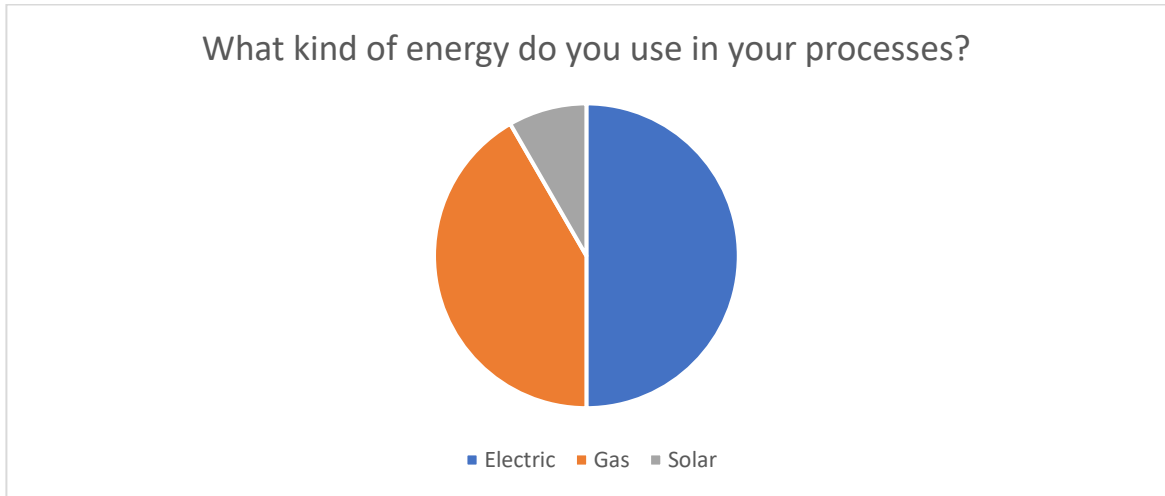


Figure 10. Type of energy used

Energy is vital in creating craft beer; it is used in all the stages of craft beer creation. Some companies use only electric energy, some others use electric and gas, and only one company uses solar energy (Cerveceria 4 palos). Solar energy is the most sustainable option, but it is expensive here in Mexico, so it is a difficult decision to be made for small companies.

6.

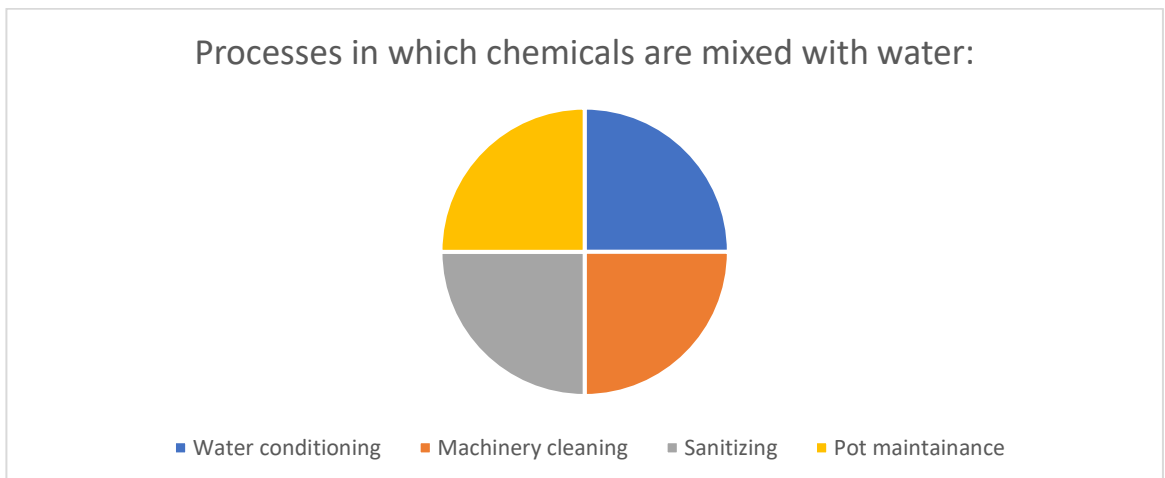


Figure 11. Processes where chemicals are mixed with water

There are four parts in the craft beer creation process where the water is mixed with chemicals. In the water conditioning process, calcium chloride and gypsum are added to the water, but these chemicals are harmless because they are human consume friendly. In the machinery cleaning, sanitizing, and pot maintenance process, these chemicals are used:

Sodium hydroxide: also known as caustic soda; mixed with chlorine, is when chlorine bleach is got. Caustic soda converts grease into soap, and it is easier to dissolve with water. Nevertheless, this chemical can release acidity, chemicals, and some other things that can be harmful to the environment.

Peracetic acid: this chemical is the reaction between the balance of acetic acid and hydrogen peroxide. It is ideal for the disinfection of surfaces that will be in touch with human-consume products. Fortunately, it has a low environmental impact due to its high reactivity; it makes this acid decompose quickly when mixed with water, resulting in low impact in wastewater and making it highly biodegradable.

Citric acid: this is a natural compound found in citric fruits and small mushrooms called aspergillus niger. It is mainly used in the food industry as a conservative flavour for candies, sodas, and more food. In the craft beer industry is used to give maintenance to the pots. It is not harmful to the environment due to its natural origin.

7.

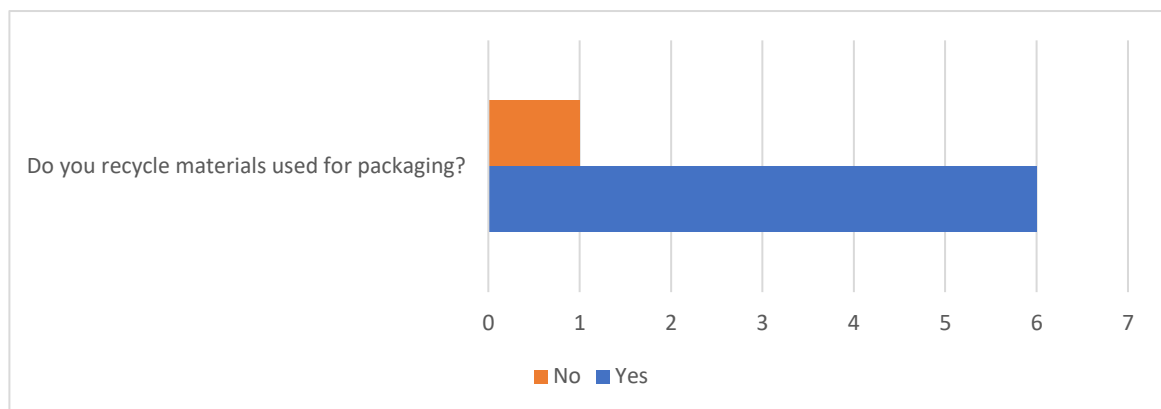


Figure 12. Recycling or reusing of packaging materials

Six out of seven companies recycle their materials used in the packaging stage. The use of reusable glass bottles is widespread, aluminum cans are recyclable, and some other materials such as paperboard, plastic containers to transport beer bottles are reusable, pallets are made with certified wood.

The only company that said they do not recycle either reuse their materials is MiQro; they noted that they used reusable glass bottles, but these bottles were needed to be cleaned and sanitized, and the company do not have the required machinery and cleaning them needed an excessive use of water; so, they opted to use non-reusable glass bottles.

5. Discussion

5.1. Key Findings

According to the interviews and the previous knowledge applied to analyze the situation, these are the conclusions to each opportunity area.

The interviewed scoop is very diverse, having small, medium, and big companies (7 companies were interviewed):

Table 1. Interviewed Craft Beer companies

Craft beer company	City	Facebook followers	Instagram followers
<i>Cervecería La Silla</i>	Monterrey	2103	970
<i>Cervecería 3 Casas</i>	Mexico City	4909	3875
<i>MiQro</i>	Queretaro	6198	1149
<i>Cervecería de Colima</i>	Colima	57505	45700
<i>La Ejemplar</i>	Queretaro	1958	413
<i>Cervecería Cuatro Palos</i>	Queretaro	2615	4829
<i>Cervecería Monstruo de Agua</i>	Mexico City	9138	13500

5.2 Energy

All the machinery they use in the beer process needs energy and/or gas. A few companies are trying to become sustainable by using solar panels to stop using electric power and gas, but this is a sharp investment that is not affordable for some companies.

5.3 Water

Water is crucial in the creation of craft beer; it is present in some stages. As a result, some companies have different strategies to save water, such as reusing it, using it for irrigation of their orchards, and using rainwater as much as they can. Being a relevant topic and a critical step in the process, companies try to make something about this.

In the cleaning and sanitizing process, some companies told me exactly which chemicals they are using for cleaning. The use of chemicals does not always mean they are harmful to the environment or the people.

- Sodium hydroxide: also known as caustic soda; mixed with chlorine, is when chlorine bleach is got. Caustic soda converts grease into soap, and it is easier to dissolve with

water. Nevertheless, this chemical can release acidity, chemicals, and some other things that can be harmful to the environment.

- Peracetic acid: this chemical is the reaction between the balance of acetic acid and hydrogen peroxide. It is ideal for the disinfection of surfaces that will be in touch with human-consume products. Fortunately, it has a low environmental impact due to its high reactivity; it makes this acid decompose quickly when mixed with water, resulting in low impact in wastewater and making it highly biodegradable.
- Citric acid: this is a natural compound found in citric fruits and small mushrooms called aspergillus niger. It is mainly used in the food industry as a conservative flavour for candies, sodas, and more food. In the craft beer industry is used to give maintenance to the pots. It is not harmful to the environment due to its natural origin.

5.4 Packaging

Packaging is an exciting stage in this industry. Most companies have glass bottles and are trying to boost the cans because aluminum is easier to recycle; nevertheless, they claim people believe that beer tastes better and has better quality in bottles, which is not true.

Some big companies ask the restaurants or bars where they distribute to have the bottles back and correctly wash them to use them again. However, sometimes this is expensive or hard to achieve, and companies end preferring other options.

5.5 Distribution

Distribution is well structured for the interviewed companies; they use their vehicles to deliver when possible. To export to other cities or countries, the consolidated charge is used to reduce logistic costs and carbon footprint.

5.6 Waste

Waste is a ubiquitous topic in the craft beer industry. The waste is wet grains, everything organic, so what all the companies do is sell at a low price this waste to farms in small towns near Queretaro to feed their cattle. On the other hand, some companies are trying to diversify what they do with it, such as innovating doing soaps, bakery, etc.

5.7 Perception of Sustainability in Mexican Industries

Taking into consideration the results of the interviews, we have two different perspectives. Sustainability is not a relevant topic for some companies due to the lack of information and knowledge. They claim not to be interested in the issue because of the lack of money and time, thinking that sustainability is expensive and difficult to achieve. It is hard to understand that sustainability does not claim a lot of money or time and does not need to be enormous changes; little things also count. Some of them do have eco-friendly processes and do not even realize it until they answered the interview.

On the other hand, some Mexican companies are more aware of sustainability in general and have it as a part of the pillars of their company, having interesting processes that have a less negative impact on the environment, creating awareness between their employees and customers, and having, as a result, a value chain.

Considering the three pillars of sustainability is highly important to understand how we are doing all the research: Environment, society, and economy. Creating an efficient plan that gives results in these three areas will be successful for the companies. Regarding the environmental pillar, making improvements can reduce climate change, air pollution, noise pollution, land use and biodiversity, and waste management in the beer industry. In the economic pillar, promoting continued growth, creating more jobs and an exemplary environment, having fair prices ensure a good choice of excellent and raw material and open competition. And in the social pillar, we comprehend the employees are given, their customers' perception and acceptance, etcetera.

A sustainable Supply Chain Management focuses on linking environmental and financial practices regarding the life cycle of the supply chain, and this is in the whole process of the product or service; it goes from raw material selection, the manufacturing part, packaging, warehousing, transport, distribution, and more stages. This process adaptation reduces the carbon footprint and has as a benefit optimization of operations and having better costs and profitable results. These practices also tend to have resulted in the social part being empathic with their consumers with eco-friendly ideas and lifestyles.

6. Conclusions

While fully understanding what sustainability is and how it is perceived and applied in Mexico, many things can be done to improve it and be more considered.

Many people do not truly and deeply know what sustainability is and how it works; some think that sustainability is all about environment and green processes and that it only benefits the world and resources. The truth is that, as this paper defends, sustainability is aiming to reduce the negative impact in the environment the society and help the economy of a company; all of these, with the goal of making this world, lasts more than the expected, being a safe place for humans and animals to live.

The green culture is something that day with the day has more impact worldwide; some countries have it more developed than others, but it is truly becoming a reality that everyone needs to face and start to act and contribute. Unfortunately, in Mexico is still a barely developing topic; some cities have more green laws and restrictions than others, but it is still not considerable progress as in European countries.

Sustainability must be promoted so everyone can fully understand what does it mean. In the interviews, many people did not even know their companies managed green processes until I talked to them and made them realize it. If green topics were more deeply explained, people would understand and empathize with them.

Craft beer companies are an industry that has an ample opportunity area due to their processes, machinery, and ingredients. Their methods can be adapted to be eco-friendly; due to the culture that craft beer has created in Mexico, it is easy for the companies to be close to their consumers and society and link with them, creating an empathic surrounding. For example, some critical craft beer companies support relevant social topics and help developing relations with organizations or simply showing their support and helping in some way.

Also, people think that to become sustainable or eco-friendly as a company implies investing vast amounts of money, but the truth is that it is not necessarily expensive; they can start with small changes and slowly increase their sustainable ideas. Over time, firms will understand that this will help them as a company, reduce costs, enhance their logistic, be admired by their customers, and a lot more.

7. Implementation of the results

This is how it is recommended to implement the results given in this paper for craft beer companies that desire more sustainable strategies.

Water

- Using rainwater for some processes of craft beer production would be ideal; for example, in the chilling process, the water does not have direct contact with the product. Forecasting when are the months where it rains and design a strategy that focuses on its use.
- Water recirculation, reusing the water of the chilling process by designing a production process where two batches of beer are being cooked simultaneously; use the chilling process of the first batch as the pre-heating of the water for the second batch: this also decreases the use of gas.
- At the moment of the machinery cleaning and sanitizing, the use of edible sanitizers would be ideal for water management. These are not harmful or pollutant to the water.

Energy

- Solar panels: even though it is an expensive investment in Mexico, it is ideal; it is also a long-term investment for the company.
- Adapting the production of the beers depending on the season for temperatures. Depending on the beer style lager or ale, this can be designed: lager beers ferment at a low temperature (6.8 C°), and ale beers ferment at room temperature (20-25 C°), taking into account the weather of the city, the production can be scheduled to the season where the climate can help to ferment beers without needed climatized rooms or just shorter time-lapses of them.
- In cold seasons, the water can be used directly from the tanks without needing chillers (automatic coolers) to decrease its temperature.

Waste

- The waste of the seed used for beer production is mainly given to farmers to feed their cattle.
- Make composts for fertilizing local agricultural fields. These composts would be mainly organic and non-harmful.
- Companies have tried to make bread and soaps out of the waste that is only seeds; they have failed, but because they have not pay too much attention to this. Developing these products would be ideal.

Packaging

- Using reusable glass bottles is ideal for craft beer companies, but it has specific management so the bottles can be washed and sanitized. Creating dissemination campaigns on how glass is reused would create awareness in the consumers and help.
- Many people think that the beer in glass bottles has better flavour and quality, but this is not entirely true; if the beer is going to be consumed instantly, or in a short or medium term, the flavour and quality is excellent. So, creating awareness of how the beer has the same taste and quality in cans would increase its use, and aluminum cans are more recyclable.
- Reuse of pallets and plastic containers in which the bottles and cans are transported is a significant input for helping the environment.

Distribution

- Using consolidated transport helps to save in logistic costs and mitigate carbon footprint.
- Having close suppliers will make it easier to get the ingredients without making long trips and using many means of transport.
- Organize a schedule for smart delivery logistics. For local distribution, a well-structured program is critical to make intelligent deliveries to reduce carbon footprint and not overspend.

Supplies

- Consuming national ingredients. Reach local farmers and offer fair prices for their products so they can opt for using better fertilizers and agrochemicals less harmful for the environment and aquifer mantles. Reaching these producers directly and create relationships where they can have better opportunities and offer excellent quality products. Empowering local producers and helping this rural sector of Mexico also make the suppliers be closer and mitigate carbon footprint.

Key Performance Indicators (KPIs)

“Indicators arise from values (we measure what we care about), and they create values (we care about what we measure)” (Meadows, 1998).

Indicators are vital in a company to detect the actual conditions in a specific topic to evaluate and manage different options to propose them, tracking the outcomes of previous actions taken, assessing the progress and overall the goals.

An adequate selection of indicators will determine which area will be analyzed to enhance further.

These are the main topics and areas to select key performance indicators:

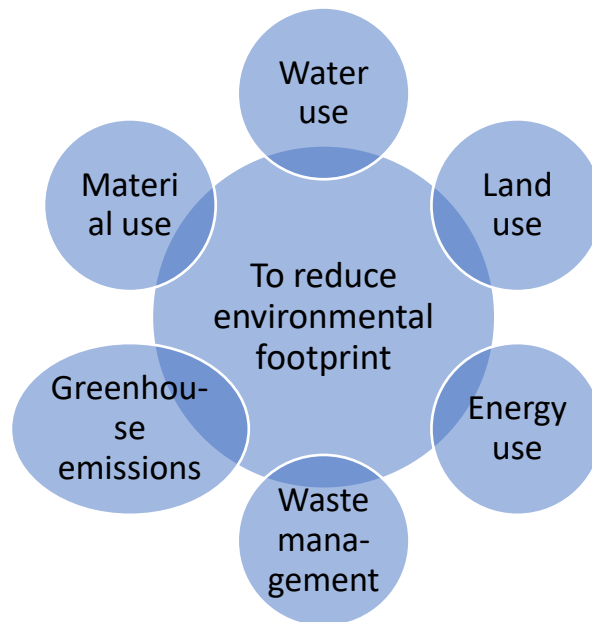


Figure 13. Topics for KPIS

Indicators must follow a criterion in order to be chosen (Fiksel 2009,):

1. **Relevant:** to the interests, showing opportunity areas to improve social and environmental conditions and the best economic parameter.
2. **Meaningful:** clarity, transparency and comprehensibility.
3. **Objective:** in every scenario possible (regional, cultural, socio-economical), showing verifiable measurement techniques.
4. **Effective:** supporting benchmarking and making possible the verification over time; the decisions to take must support the performance improvement.
5. **Comprehensive:** offering an overall evaluation of the progress of sustainability objectives.
6. **Consistent:** by enabling cost-effective and inexpensive implementations and leveraging existing data collection where possible.

These mentioned indicators should have the following attributes (NRC, 2011):

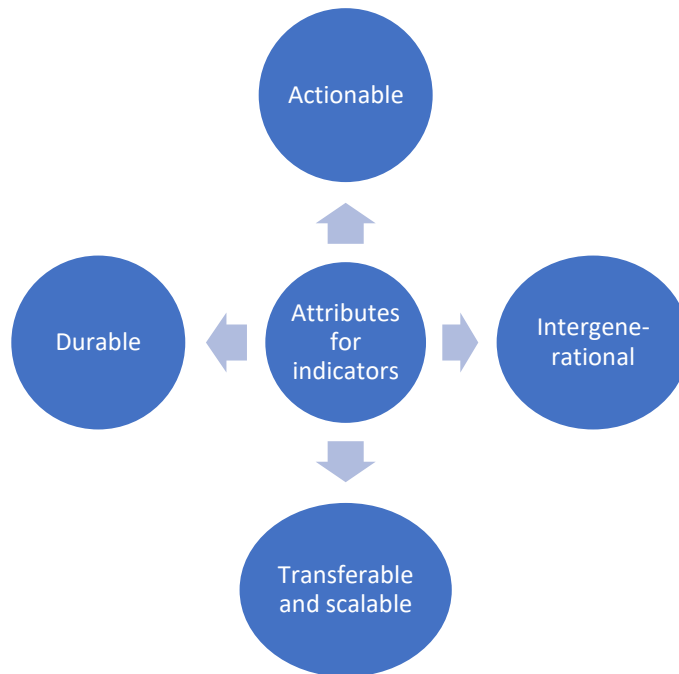


Figure 14. Attributes for indicators

- **Actionable:** so that practical measures can be taken to approach contributing factors.
- **Intergenerational:** showing a fair distribution of costs and advantages between different generations.
- **Transferable and scalable:** so they can be easily adapted to regions, states, and locally.
- **Durable:** so they can achieve long-term importance.

The most accurate KPIS would be:

1. Percentage of materials used that are recycled input materials.
2. Product recycling rate
3. Waste reduction rate.
4. Energy saved due to conservation and efficiency improvements.
5. Solid waste per unit of GDP.
6. Water footprint.
7. Saving levels due to conservation and improvement efforts.
8. Load density.

The most efficient performance in KPIs programs are the ones that focus on the needed quantifiable KPIs covering the most relevant aspect of sustainability for the specific company needs.

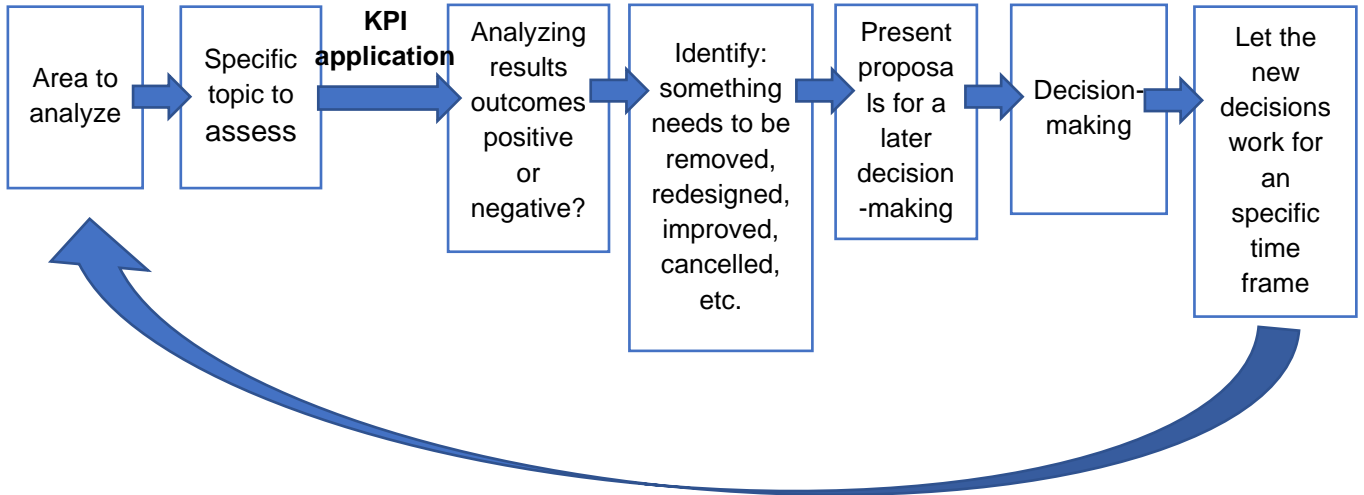


Figure 15. KPI application process

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Appendices

Appendix 1. Layout of Webropol Interview



Sustainability in the Mexican craft beer industry

1. Contact form

Name	<input type="text"/>
Last name	<input type="text"/>
City	<input type="text"/>
Company	<input type="text"/>
Position	<input type="text"/>

2. How many employees are there in your company?

Number of employees	<input type="text"/>
---------------------	----------------------

3. Do you have sustainable processes in your company?

- Yes
- No

4. If the answer is "yes" specify which processes. If the answer is "no" specify the reason.

<input type="text"/>
<input type="text"/>
<input type="text"/>

5. Counting with these processes in your company has helped you economically and/or socially?

6. Do you count with some certification that endorses green processes or sustainable process in the company? Specify which one.

- Yes
- No
- In process

7. Are you actually exporting your product to foreing countries? Which countries?

- Si
- No
- Estamos en proceso
- Tenemos planes

8. If the 7. answer is "no", explain why.

9. Do you have the knowledge of the requirements about sustainability in the countries your aiming to export?

10. What kind of energy do you use?

Electric

Gas

Solar

Other

--

11. In some moment of the process are there any chemicals mixed with the water?

Yes

No

--

12. Which materials do you use for the packaging?

13. Are these materials recycled?

Yes

No

--

--

14. Do you try to have links with stakeholders that worry about the environment?

15. Are your suppliers close to you?

16. Are there any pesticides and/or fertilizers used in the agriculture of the supplies?

17. How do you get your supplies?

18. What do you do with the waste?

--

19. Nowadays, in which cities are you selling you beer?

20. How do you distribute your beer to your points of sale?
