

# Waste Management Benchmarking in Industrial International Companies

Lorena Palomino Ortega





<b>Author(s)</b> Lorena Palomino Ortega	
<b>Degree programme</b> Business Administration: major in International Business	
<b>Report/thesis title</b> Waste Management Benchmarking in Industrial International Companies	<b>Number of pages and appendix pages</b> 40 + 12
<p>The accurate waste management in industrial companies is essential now a days, due to the high impact on the environment. There are different ways to get benefit from the correct waste management if it is done correctly.</p> <p>The thesis is qualitative research based on a benchmarking tool to study waste management processes in manufacturing international companies in Mexico. The research methods were desktop research and interviews to the ones in charge of the process in the companies.</p> <p>Benchmarking is a tool to help the user continuously improve a specific process or activity. The competitor is studied to obtain information on their practices, analyze them, and apply them to the desired improvement area. The active type of benchmarking was used for this study because it did not study the same industry but the same process.</p> <p>The research studies waste management, the different types of classification, regulations and laws in Mexico for accurate and responsible waste management and the legal framework to comply in the industries. They must have a journal where they record all the information from all the waste generated inside the company. If some of them are hazardous, the appropriate classification of the materials must be learned.</p> <p>Industries play a considerable role in the pollution of our world nowadays, and it is crucial to be ethically responsible within the business. It gives a good awareness to the stakeholders and customers at the time of choosing their network.</p> <p>From the suggestions given to the company, some improvements can be made to the current activities and enhance their processes. The company must have an official journal to keep the record of every single activity, a backup plan for emergencies must be elaborated and employees designated for the waste management process. The company should also sell the waste from the non-hazardous materials.</p>	



**Keywords**

Benchmarking, Waste Management, Hazardous Waste, Business Ethics

## Table of contents

1	Introduction .....	1
1.1	Objective, Key Concepts and Justification.....	1
1.1.1	Objective .....	1
1.1.2	Key Concepts.....	2
1.1.3	Justification .....	4
1.1.4	Real-life phenomenon .....	6
1.2	Theoretical Framework .....	7
1.2.1	Benchmarking Background .....	7
1.2.2	Green Economy .....	9
1.2.3	Corporate Social Responsibility.....	11
1.3	Research Questions, Limitations and Demarcation.....	13
1.3.1	Research Questions.....	13
1.3.2	Limitations.....	14
1.3.3	Demarcation.....	14
1.4	International Aspect .....	15
1.5	Research Methods.....	16
2	Benchmarking .....	18
2.1.1	Benchmarking .....	18
2.1.2	Types of Benchmarking.....	18
2.1.3	Process Steps.....	19
2.1.4	Benefits of Benchmarking .....	21
3	Waste Management .....	23
3.1	Waste Management in the Industrial Sector.....	24
3.2	Waste Management in Industrial Companies in Mexico .....	26
3.2.1	Official Mexican Norms for Hazardous Management.....	27
3.2.2	Official Process in Mexico .....	27
3.2.3	Hazardous Material Classification .....	28
4	Case Study: Rosenberger Waste Management Process.....	30
4.1	Commissioned Company: Rosenberger.....	30
4.2	Benchmarked Company: Oeschler.....	33
5	Conclusions and Suggestions .....	38
5.1	Conclusions .....	38
5.2	Suggestions for stakeholders .....	39
	References .....	41
	Appendix .....	45
	Appendix 1. Principal Generate of Hazardous Materials Industries .....	45

Appendix 2. Maximum Limits for PECT Toxic Waste by Materials.....	46
Appendix 3. Rosenberger interview to Engineer Elizabeth Palomino, Supply Chain Manager.....	47
Appendix 4. Description of the hazardous material and designated areas.....	49
Appendix 5. Labels for identifying type of waste .....	50
Appendix 6. Hazardous Waste Journal .....	<b>¡Error! Marcador no definido.</b>
Appendice 7. Confidential information from Oechsler .....	<b>¡Error! Marcador no definido.</b>

## **1 Introduction**

This thesis is a research-based bachelor's thesis for the International Business Degree Program from Haaga-Helia University of Applied Sciences at Universidad Mondragón México on Marketing specialization. The research aims to provide information on sustainable innovation processes implemented in an International Manufacturing Company. The scope of the study is to analyze the sustainable practices/processes in manufacturing companies, focusing on the waste management of the residues to improve and bring new ideas to the commissioned company (Rosenberger), which can enhance the economic factor in the company.

Green Economy has become a trending topic at a worldwide level, therefore making a benchmarking analysis. Sustainable practices are the future for the business, not just bringing awareness but also an investment that will reduce costs in the long term, not to mention is a must, due to the different regulations they have been releasing in other countries. Becoming a company socially responsible from their processes could have more benefits than we thought.

An environmentally aware business considers more than just profits — it considers its impact on society and the environment. Such a business is sustainable because it contributes to the health of the structure within which it operates, thereby helping construct an environment in which the company can thrive. (Maty 2020).

The benchmarking analysis was focused on the waste management of the company; some of the materials require special treatment, therefore, cannot be thrown away as common materials like paper, cardboard, plastics, among others. A 3rd party manages the hazardous materials. The company needs to know how its partners work the processes because it is part of their corporate social responsibility.

### **1.1 Objective, Key Concepts and Justification**

#### **1.1.1 Objective**

This research aims to acquire the different techniques used by global companies into my commissioned company and make the companies realize the importance of the development of sustainable practices into the business. Also, gather new ideas and improve the ones already implemented on it and analyze the benefits from each one of them.

As many big manufacturing companies do not have time to focus on more tasks, the ones of their main core hire 3rd party companies to manage their disposals, but not all of them know how they do their jobs. It is crucial when it is an international company because they should consider the practices of their suppliers. In the last years, environmental concerns have been a dent in business awareness, and waste treatment has become one of their priorities. "The main sources of savings are obtained following minimization and segregation at source, a change in waste treatment, supplier adequacy, logistics optimization and price negotiation" (Expense Reduction Analysts 2021.)

Making the company aware of what it could improve in its internal and external waste management will contribute to its circular economy and find hidden sources of savings in its activity. They gain more financial resources to develop economic projects while being socially responsible in their business.

### **1.1.2 Key Concepts**

There are several key concepts to understand what this thesis talks about; in my opinion, these are the most accurate concepts but could slightly change from one idea to another.

CSR According to OECD Library (2001), Corporate Social Responsibility (CSR) is a business's contribution to sustainable development. Today, corporate behaviour must not only ensure returns to shareholders, wages to employees, and products and services to customers; it must also respond to societal and environmental concerns.

Benchmarking is the process of identifying, understanding and adapting outstanding practices from organizations anywhere in the world to help your organization improve its performance. (Introducing Benchmarking, Oy Benchmarking Ltd 2016).

Benchmarking is a process where you measure your company's success against other similar companies to discover a performance gap that can be closed by improving your performance. Studying other companies can highlight what it takes to enhance your company's efficiency and become a more prominent player in your industry. (Oberlo 2017.)

Waste Management is the concept of waste management involves collecting, removing, processing, and disposal of materials considered waste. Waste materials can be solid, gaseous, liquid, or even hazardous and are generally generated through human activity. (Ecolife a guide to green living 2011).



Business Ethics are the moral principles that act as guidelines for how a business conducts itself and its transactions. In many ways, the same policies that individuals use to show themselves acceptably – in personal and professional settings – apply to businesses. (CFI 2018.)

Hazardous waste is a waste with properties that make it dangerous or capable of harming human health or the environment. Hazardous waste is generated from many sources, ranging from industrial manufacturing process wastes to batteries and may come in many forms, including liquids, solids, gases, and sludges. (United States Environmental Protection Agency 2020)

Circular Economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. (European Parliament 2015.)

Storage of hazardous waste is the action to temporarily retain hazardous waste in areas that meet the conditions laid down in the applicable provisions to prevent its release. As long as they are processed for use, a treatment is applied, transported or finally available. (Reglamento de la Ley General para la Prevención y Gestión Integral de los Residuos 2006.)

Collection is the action of gathering waste from one or different sources for its management. (Reglamento de la Ley General para la Prevención y Gestión Integral de los Residuos 2006.)

Hazardous Waste Collection Centre Authorized installations by the Secretariat provide services to third parties where hazardous waste is temporarily received, collected, transferred, and accumulated and then sent to facilities authorized to treat, recycle, reuse, co-process or final disposal. (Reglamento de la Ley General para la Prevención y Gestión Integral de los Residuos 2006.)

Controlled confinement is the engineering work for the final disposal of hazardous waste. (Reglamento de la Ley General para la Prevención y Gestión Integral de los Residuos 2006.)

Recycling of waste is any recovery operation by which waste materials are reprocessed into products, materials or substances, whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations. (Eurostat 2014.)

### 1.1.3 Justification

The reason for choosing this topic is that international companies receive a lot from their customers and different markets, but if they could help the world where we all live and help our communities, it should be a matter of them. Companies worldwide have realized that there is a need for broader accounting of their performance towards stakeholders as against mere bottom line accounting that is of interest only to stockholders. (Fernando, A. C. 2009).

Sustainability has become a topic of interest growing over the years and will not go away. Consumers had begun to take into consideration at the time of purchasing their goods the processes and materials used in a product. They have become aware of the consequences and impact of the industries on the environment; however, companies also have become aware of the situation. That is why a lot of business has been investing in changing their manufacturing processes and materials.

On the other side, new regulations have been implemented, and this is due to the high impact the industry plays on our environment. The studies show that more than 30% of Co2 emissions come from the industry. (Global Alliance for Buildings and Construction 2018).

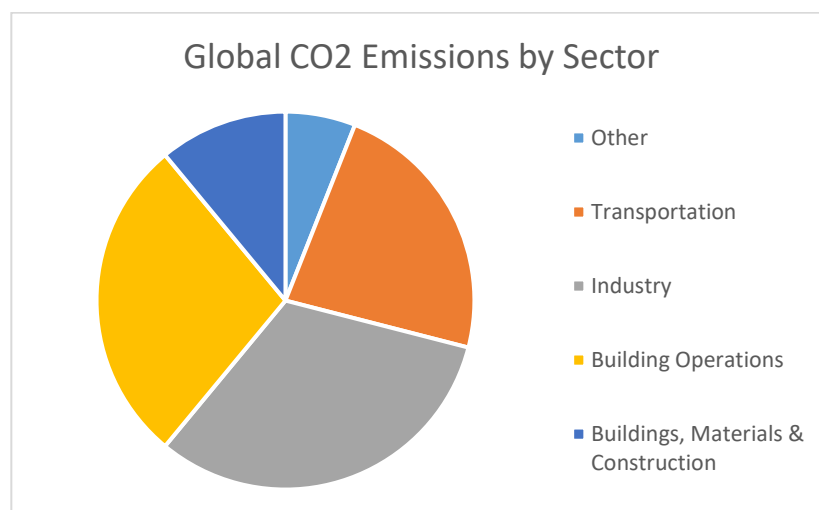


Figure 1. Global CO2 Emissions by Sector (Global Alliance for Buildings and Construction 2018 Global Status Report)

According to Environmental Sustainability, we are on pace to produce 27 billion tons of solid waste by 2050 due to a business environment that prioritizes rapid production and turnover of products for maximum profits. Big Industries play a high role in the pollution of the world, but it can be played positively; by implementing different actions, the industries could significantly reduce the CO2 emissions emitted by these sectors.

Companies leading in sustainability are integrating their strategy into the corporate governance and operating frameworks. Social and environmental risks are identified as business risk categories and are formally embedded into enterprise risk management and measurement processes (Taticchi 2010).

In all types of organizations can be implemented different sustainable practices. Each member of the organization could contribute to the change for better methods. The employees, which are the ones who have a daily approach to the processes, can have insights into the strategies, they can identify the gaps in the organization, and with some feedback to the organization, could improve the process while saving wastes of material or time. "It's important to create a company culture that reflects your values and makes employees comfortable enough to share their ideas, including those regarding sustainability" (Maryville University 2020).

#### ➤ Consumer Perception

People are starting to become more conscious about the role that the industries play in the environment; here are some facts from the Cone Communications Study about consumers opinion about CSR.

According to the Cone Communications CSR study (2017).:

- 63% of Americans want corporations to drive social and environmental change in the absence of government action.
- 87% of American consumers will purchase because a company advocated for an issue they care about.
- 76% of Americans expect companies to act against climate change.
- 73% of Americans would stop purchasing from a company that does not care about climate change.

### ➤ Business Perception

CSR plays a significant role in the consumers and the business leaders, and future stakeholders.

- According to the 2018 BSR/Globescan survey of business leaders in charge of sustainability and corporate social responsibility, respondents identified ethics and integrity as the No. 1 reason for pursuing business sustainability.
- 75% of corporate sustainability professionals say that businesses need to better include sustainability into business strategy to address global mega-trends.
- 64% of North American respondents said sustainability needs to influence core business activities such as strategy and value creation; 84% of European respondents and 89% of respondents everywhere else agreed.
- Less than 33% of respondents said their businesses are engaging with sustainable strategic planning.  
(BSR/Globescan 2018.)
- Corporate reputation was the #1 driver to sustainability efforts (State of Sustainable Business 2018.)

### ➤ Business Impact

According to a report from The New Climate Economy (2018.), 95% of plastic packaging, the equivalent of \$120 billion annually, is wasted after the first use, and microplastics have been found in 114 aquatic species.

Industries must drop carbon emissions by 40% by 2060 to stop the planet from warming over two degrees Celsius. In combination with action from governments and other stakeholders, businesses that act on climate change by adopting green policies, technologies, and strategies for growth could realize a total of \$26 trillion in economic benefits. (The New Climate Economy 2018.)

#### **1.1.4 Real-life phenomenon**

It is essential to bear in mind that waste management in the industry is vital because a single error can lead to numerous tragedies in the company and affect not only internally but externally.

A real-life case occurred in 2019 when Grupo Mexico, one of Mexico's most prominent companies in the mining, infrastructure, and transport industry, had an incident in hazardous waste management.

It accidentally poured 3,000 litres of sulfuric acid into the Sea of Cortes, which caused irreparable damage to the environment. Hundreds of inhabitants of the coastal area of Sonora shared images on their social networks of dead marine animals in the vicinity where the sulfuric acid spill occurred. (Infobae 17 July 2019.)

Also back in 2014 Buenavista del Cobre in Cananea, a subsidiary of Grupo Mexico, spilled 40.000 cubic meters of copper sulphate on the Sonora and Bacanuchi rivers. Its clear blue waters were painted metallic reddish. The environmental disaster affected the health of 24.000 people and indirectly the lives of 250.000 people in seven municipalities who saw their crops and sources of work destroyed. (Infobae 17 July 2019.)

Grupo Mexico lost 17,438 million pesos, representing 4.54% less than the value it had before the incident on the Mexican Stock Exchange. Not to mention the fines that were applied to the company and the damage made to the reputation of the company. (Infobae 17 July 2019.)

This is why companies that perform industrial activities must count on an Emergency Response Plan to carry out the actions required to contain the possible risks if they generate them.

## **1.2 Theoretical Framework**

The theoretical framework core of this thesis is benchmarking. The target of benchmarking is to improve and upgrade performance gaps in a business sector. This will help set clear goals and objectives and marks for a company, but as my benchmarking is related to the good practices in a company, I needed to mention the corporate social responsibility a company must have and green economy to create awareness in modern business.

### **1.2.1 Benchmarking Background**

Benchmarking is a common term used in a lot of multinational and national companies nowadays, and it may be perceived as a practice that has always existed since the business started. It seems as if the practice that copies the practices/products from other company but it goes beyond that.

The term benchmarking was coined in 1976 by Gregory H. Watson, former vice president of quality at Xerox Corporation. He points out 5 phases across the years of benchmarking;

reverse engineering, competitive benchmarking, process benchmarking, strategic benchmarking and global benchmarking. reverse-engineering occurred in the 1950s to the mid-1970s, where the procedure was about tearing things apart, examining them and try to catch which things could be improved before putting them back together. (Hotstats 2018.)

In the 1970s, the model started to change when Xerox began to face a new challenge with its competitors. They were the principal manufacturers of the copy machine until the Japanese competitors started manufacturing higher quality machines for less money than theirs. When they began to investigate how their competitors could improve their processes, changing into competitive benchmarking. (Hotstats 2018.) In the 1980s, they started to look into the best practices of other companies from different sectors. Even if it wasn't the same, Xerox decided to take one more step and look at how they worked in other industries, making the process of benchmarking a new phase. (Hotstats 2018.)

At the end of the '80s was when strategic and global benchmarking emerges. Strategic benchmarking takes a long-term view of company direction relative to the future strategies of competing companies. It looks at what other companies are doing in terms of full management capabilities, strategic initiatives, competitive product development and other long-term qualities and processes have proven successful. (Chron 2021.) The easiest way to find information about other companies when doing strategic benchmarking is to look for annual reports in public companies on the internet. It is an easy way to find out what are new strategies and how they plan to go.

The final phase of the benchmarking path was global benchmarking; they examined in a global scale that involves examining standards on a worldwide scale, including international trade, cultural and business processes. (Hotstats 2018.) This final phase became an essential tool. World Health Organization started incorporating in their activities this tool called "WHO Global Benchmarking Tool (GBT) for evaluation of national regulatory systems". Commonly used in the medical sector to assure quality, safety, and efficacy of medical products worldwide. Currently, the GBT is eligible to benchmark the regulatory systems for medicines, vaccines, and blood products. (World Health Organization 2018.)

XEROX Benchmarking Chronology	
Year	Activities
1979	Benchmarking as a competitive strategy introduced
1981	U.S. and Japan manufacturing studies initiated
1982	Benchmarking in non-manufacturing units begins
1983	Benchmarking integrated as part of a "Leadership- Through- Quality" strategy
1984	Corporate-wide competitive benchmarking network formed
1984-89	Benchmarking application internalized
1989	Baldrige award winner
1990+	Benchmarking totally integrated at all levels

Figure 2. Xerox Benchmarking Chronology (Operational Excellence Consulting 2019)

This is the timeline of the pioneer of Benchmarking, the complete stages of the benchmarking across Xerox history over time. Passing the years, they kept a continuous improvement in the tool until they achieve the benchmarking as we know it nowadays, integrated at all levels.

### 1.2.2 Green Economy

Through the years, our world has been experiencing dramatic changes in the environment, climate change, water scarcity, pollution, deforestation, greenhouse gas emissions, and the list could go on.

The global economy can be characterized by its dependence on the ongoing exploitation of Earth's natural resources and its people, and it has been described as an extension of a colonial system (Cato, 2009). The objective of ecological economics is to enhance theoretical understanding of the human economy and to develop practical solutions to achieve long-term socioeconomic well-being without under (Robert B. Richardson 2013).

A green economy would be renewable, equitable, and profitable. It would aim to reduce dependence on fossil fuels, minimize impacts to ecosystems, and sustain socioeconomic well-being for all people by ensuring social equity and a fair distribution of wealth. (Robert B. Richardson 2013, 8)

Thus, companies started thinking beyond the economic sector, but also sustainably and socially, here is where the Triple Bottom Line (TBL) came up, also known as the 3 P's. These 3 P's refer to People, Planet and Profit.



Illustration 1. Triple Bottom Line (John Elkington 1994)

As we can see, in the image are represented the 3 P's of the Triple Bottom Line

➤ Planet

The P for Planet in the triple bottom line indicates that an industry should be concerned and take actions that support the environment. It could be as simple as reducing the footprint they emit. Some objectives usually take into consideration are:

- Sustaining economic, environmental, and social well-being
  - Reducing greenhouse gas emissions and other pollution
  - Enhancing energy and resource efficiency
  - Minimizing biodiversity loss and adverse impacts to ecosystem services
  - Increasing social equity and inclusion
    - Promoting a fairer distribution of wealth within and among nations
- (B. Richardson 2013, 9)

➤ People

The P for People involves all the good practices the business has for its employees and stakeholders. Fair and inclusive practices are part of this P and occur inside the company and the actions in society.

This brings mindfulness to the company, is seen as a socially skilled trade that too improves the efficiency of your workers. As they feel exceptional and steady in their works, it will increment efficiency and create more benefit.



Every person who is in contact with the organization is part of the Triple Bottom Line.

Some examples a company can include in the business are:

- Equality of gender
- Support employees in social actions
- Contribute with donations for social goals
- Promotion of ethical practices etc.

➤ Profit

Of course, the main goal of every business is to have profit from their sales; the more revenue, the better. But in Profit in the Triple Bottom Line, the 3 P's can be combined and still get more income. Investing in the people or the planet does not mean it is only a matter of good actions but can also benefit.

One case is the Swedish furniture mammoth IKEA detailed deals of \$37.6 billion in 2016. The same year, the company turned a benefit by reusing squander into a few of its best-selling items. Sometime recently, this squander had taken a toll on the company more than \$1 million per year, and the company is well on its way to "zero waste to landfill" worldwide. According to Joanna Yarrow, IKEA's head of sustainability for the U.K., "We don't do this because we're tree huggers; we do this because it's very cost-effective." (University of Wisconsin System 2017.)

### **1.2.3 Corporate Social Responsibility**

According to OECD Library (2001), Corporate Social Responsibility (CSR) is a business's contribution to sustainable development. Today, corporate behaviour must not only ensure returns to shareholders, wages to employees, and products and services to customers, and it must also respond to societal and environmental concerns.

Must consider that CSR has more than one impact on society; several actions can be done, like environmental management, labour standards, equity of gender, social campaigns, ecological matters, and different people. It focuses on ecological, social and economic issues, from the employees to the suppliers and stakeholders. This aims to be committed to everyone in their surroundings.



Figure 3. Shows the Carroll Model, which talks about CSR in the different sectors. (Carroll Model 1991)

The social and natural activities that businesses engage in are bound to bring focal points moreover to society. Corporate social obligation irrefutably gives different benefits for the company. Locks in social obligation issues ought to be a considered choice, and companies ought to consider its masters and cons.

In 1991, Carroll extricated the four-part definition and recast it within the shape of a CSR pyramid. The pyramid was to single out the definitional aspect of CSR and demonstrate the building piece nature of the four-portion system. The pyramid was chosen as a geometric design because it is straightforward, natural, and built to resist the test of time. Thus, economic responsibility was put as the base of the pyramid since it may be a foundational necessity in trade. Fair as the building's footings must be solid to back the whole structure, and supported benefit must be reliable to support society's other desires of undertakings. The point here is that the framework of CSR is built upon the preface of a financially sound and maintainable trade. (Int J Corporate Soc Responsibility 2016.)

Law and controls are society's codification of the fundamental ground rules upon which trade is to function in a compassionate society. For case, whether a legiti-

mate and administrative system exists or not altogether influences whether multinationals contribute there or not. It passes on the message to trade that it is anticipated to comply with the law and comply with regulations. CSR gives an establishment for legitimate trade development, so it is essential to search for the lawful framework.

In brief, the pyramid is built in a design that reflects the fundamental parts played and anticipated by businesses in society. It is expected to be a great corporate citizen, that's, to provide back and contribute monetary, physical, and human resources to the communities in which it may be a portion. The commerce has the desire, and commitment, essentially do what is proper and reasonable to dodge or minimize hurt to all the partners with whom it interacts. (Thacker 12 November,2019.)

### **1.3 Research Questions, Limitations and Demarcation**

#### **1.3.1 Research Questions**

The research aims to provide information about waste management in the manufacturing industries through a benchmarking strategy. The expected outcomes will provide examples of processes implemented in similar sectors and their impact on the social or economic sector.

The research question of the thesis is the following:

*Waste Management Benchmarking in Industrial International Companies*

The research question will be divided into 3 investigative questions to provide clear information about the research and have a clear scope.

The investigative questions are the following:

1. How can a company get benefit from their waste management processes?

Explaining the positive effects on the good practices of waste management will make aware the companies of this process's role will encourage the company to do it in the right way.

2. How can waste management give revenue in the long term?

The main goal of a business is to generate profit from it; the purpose of this question is to make them realize that they can reduce costs while saving money in the long term.

### 3. Which are the risks of working with hazardous materials in a company?

There are many risks implied when they manage hazardous materials, but not all companies are aware of the possible risks it takes; it can affect the employees, the environment, and the company's reputation if something goes wrong. Many things can be learned to avoid risky situations and make them aware that having a backup plan is necessary.

### **1.3.2 Limitations**

This thesis aims to provide information about the current processes from another international industrial company located in Mexico about the waste management process. Benchmarking can be the primary of numerous steps to move forward a company's performance. The research will not be compared with direct competitors but indirect. Some of the limitations this research may present is the lack of information; It must be gathered from the inside of the competitors, as it is a process from the company; usually, they are not up to share their strategies and help students that are not doing their internships with them might be hard to trust due to confidentiality agreements inside the company.

Another limitation the research could present is the lack of response from the interview candidates, and not that specific information of the final stage of the product because both of them, at the final stage of the hazardous materials, work with 3<sup>rd</sup> party companies where is not that easy to get information from the inside, especially in a country like Mexico where they are petrified of the competitiveness between companies of the same sector; in this case waste management companies.

In addition, the benchmarking is only going to be focused on Analysing and planning. The suggestions will be given to the commissioned company Rosenberger but implement the recommendations into it will only depend on the manager of the area and its colleagues. It does not contribute to solving the issues on its own.

### **1.3.3 Demarcation**

The research will be based on the German company "Rosenberger OSI", a manufacturer of innovative fibre optic cabling infrastructures in Europe. Until the date, this company has

three production plants located in Germany, Hungary, and Mexico. The research will be based on the Mexican branch, which was designed for more than 3 million assemblies.



Illustration 2. Rosenberg Mexico (Rosenberger,2019)

The Mexican branch is located in Apodaca, Nuevo León, in Mexico. It is a 400 m<sup>2</sup> plant that continues growing and has employed more than 350 people and wants to double the production for the incoming years.

#### **1.4 International Aspect**

The international aspect required for this BBA thesis will be fulfilled by studying the different processes in two multinational companies and communicating through emails, interviews, phone calls etc., with people from different cultures and countries.

The research did go through global companies and their different practices across the world. Also, this research aimed to help any business that wants to start incorporating sustainability practices into their company. International organizations like the United Nations and additional sustainable agreements will be studied, making the research helpful to whoever wants to upgrade their techniques into their business even if they are across the world.

The two companies that were analyzed, have locations in Europe and America and both in Mexico, which is an optimal location for all the companies that want to establish their manufacturer companies there due to the multiple benefits it can offer: cheap hand labour, an optimal place for more affordable deliveries, a lot of trade agreements, among others. This will also help other companies know the typical processes and regulations they need to comply with hazardous materials.

## 1.5 Research Methods

For the research, qualitative and desktop research methods were applied, but we must first understand what qualitative research is and how it is obtained.

Qualitative research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. (Snap Surveys,2017.) Qualitative research strategies are outlined to help uncover the behaviour and recognition of a target audience concerning a specific point. There are distinctive sorts of qualitative research strategies like an in-depth interview, focus groups, ethnographic research, substance examination, case think about research as a rule used. The comes about of qualitative methods are more descriptive, and the inductions can be drawn very effortlessly from the information obtained. (QuestionPro 2021.)

However, sometimes qualitative method is perceived as imprecise because it is hard to tell how biased the result is based on people's opinions, ideas, and perceptions. You cannot have a precise statistic with just qualitative research. The qualitative methodology is chosen because the views and processes used within the company and their views of the advantages and disadvantages must be understood; since there is no public data for the processes inside the company, is better to work with qualitative method to understand the perceptions of the workers within the company. (McLeod 30 July 2019.)

One example for understanding the reason for selecting qualitative research is the automotive company Toyota, famous for their production system and quality, but which is the reason for the continuous improvement in their grade? It is their employee's participation. Each year this company implemented nine new ideas from their employees into the company. There is no better way to know the areas of improvement in a process than to ask the ones who are daily operating the machines. This information could never be obtained with quantitative research. An inside into the employees' feedback is required for the benchmarking process.

Research following a qualitative approach is exploratory and seeks to explain 'how' and 'why' a particular phenomenon, or behaviour, operates as it does in a particular context. It can be used to generate hypotheses and theory from the data. (McLeod 30 July 2019.)

In addition, Internal desktop research is going to be applied; it can be treated as the most reasonable starting point of study for any organization. Much information could be generated internally within the organization as a course of normal process. (Juneja 2015.) The reason for this method is that internal files from the competition are going to be analyzed, as it is a process benchmark. Getting data from public websites is not an option. For instance, why the explanation of the competition's process is not going to be cited. Confidential agreements were signed, which established the confidentiality of the employees, and the official documents were not able to publish online or shared with a third party.

## **2 Benchmarking**

In this chapter, focus on benchmarking tool, what it is, like using it, its processes, and the benefits it brings to the company to understand it a little better. Each subtitle explains more in detail what is the topic referred.

### **2.1.1 Benchmarking**

Benchmarking is the process of identifying, understanding and adapting outstanding practices from organizations anywhere in the world to help your organization improve its performance. (Introducing Benchmarking, Oy Benchmarking Ltd, 2016.)

Doing a benchmarking strategy does not mean copying the process from a company. Still, it is to study the successful companies and analyze the different functions to be implemented in a company but improved. The essential thing in a benchmarking strategy is understanding 100% of the process studied.

### **2.1.2 Types of Benchmarking**

There are several types of Benchmarking that exist, according to Aeuro (2020.), but the common objective of these is still the same: To help managers look outside their departments and organizations. Instead, focus the attention on competition or the sectors in which companies are examples of best practices. The types of benchmarking are competitive, internal, functional, and digital.

Competitive Benchmarking is when there is aggressive competition. And it is given by comparing some aspects with market leaders or the most direct competitors. This kind of process is the most difficult to put into practice because of the limited information companies provide about their methods. Usually, the information comes from the inside or a commissioned company that works as a 3rd party to obtain information.

Internal Benchmarking occurs in large companies and is made up of numerous departments or divisions. It is, therefore, widespread to compare the levels that are achieved within the organization. They are given within the same company, and it is easier to obtain because larger companies share their practices and reports on the internet.

Functional Benchmarking focuses on comparison with companies that do not belong to the same industry. This is an advantage because the necessary information can be ob-



tained. After all, it is not a direct competitor of the company. It is a very functional and productive benchmarking because it is not about organizations that are direct competitors. So, there will be no or problems with confidentiality when providing the necessary information for the study.

Digital Benchmarking is a studio based on digital channels. Examples of the actions taken here are comparing the own websites, apps, and social networks with competitors. As well as monitoring their implementations and innovations.

(Aeuroweb 4 February 2020.)

### 2.1.3 Process Steps

Once knowing what benchmarking is, it is essential to see the process steps of benchmarking to do it properly and obtain the results as desired.

Here are the steps and aspects of following for a benchmarking process:

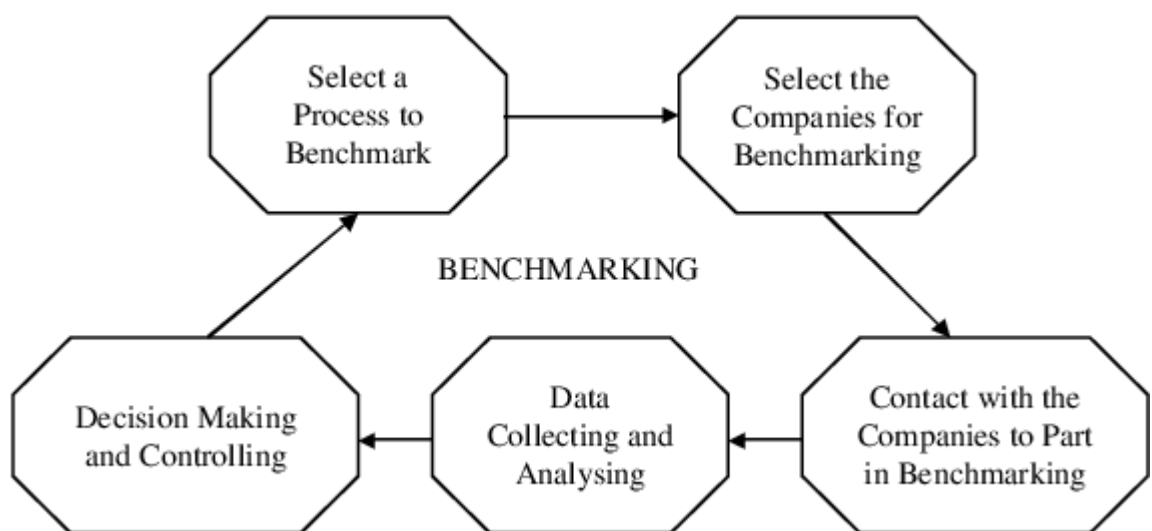


Figure 4. Benchmarking Stages (Goncharuk, Anatoliy & Getman, Maryna 2014).

Benchmarking is a multifaceted tool. It is applicable for the identification of success factors and key processes in your company. (Tuominen 2016, 24.) It is not just a strategy to copy their competitors. It is a non-stop improvement tool; setting determined goals in the company based on their needs and adjusting them to the business model will keep the continuous improvement.

The fundamental goals that a benchmarking handle looks for to attain are:

- Characterize new examination concepts.
- Extend information about the company itself.
- Distinguish areas to be improved.
- Set realistic and feasible targets.

- Empower more prominent information of the competition and competitive to advertise level.
- Adjust organization with best market practices.
- Set up modern methodologies and move ahead of competitors.
- Improve commerce communication.
- Idealize processes.
- Reduce the number of blunders.
- Decreasing costs.

These are recommended stages to follow to a feasible benchmarking process.

#### 1. Examining your commerce

Examining your possess commerce is exceptionally critical for you to get it which inner forms or trade hones ought to be made strides. That analysis can be done, for illustration, by distinguishing the main common complaints among your customers' feedbacks.

#### 2. Selecting the sort of benchmarking

Selecting benchmarking will depend on the reason and who the benchmark is in that respect. From what is characterized within the purpose, the hone comparison will be between offices inside the claim company, organizations with a similar profile but not fundamentally inside the same segment or together with the coordinate competitors.

#### 3. Choosing which companies to analyze

Depending on the forms and hones you need to make strides, you may have to analyze other companies. Ideally, you select from one to three companies. It continuously looks to take those who are advertising pioneers and who have practical activities in their history.

#### 4. Characterize the information to be collected.

Here is the time to decide the data to be collected, to gather the information related to the comparative aspects of the companies chosen. For case, if a benchmarking investigation of advanced nearness is required, online data must be collected from companies, investigate their social networks, web journals or sites, the position in search engines, in case there are numerous claims, the speed of reaction they have, the speculation in paid activity etc.

#### 5. Analyze the collected information.

Once gathered all the data, the following step is to analyze it. Comparisons need to be made, see the greatness of the contrasts, discover the relationships that can be made along with the own business, and see what variables can be used and what's not significant to the company. This way, it may utilize what worked as a reference and consider the blemishes not to rehash them in the planning.

## 6. Executing enhancements

With all the data gathered is time to optimize processes and practices. A report ought to be arranged with all the conclusions gotten, the openings experienced, the critical focuses of change within the procedures, and possible dangers and proposals on dodging them. In expansion, vital arranging and activity arrangements oughts to be made to actualize the changes distinguished amid benchmarking.

(Business New Daily 2021).

### 2.1.4 Benefits of Benchmarking

Businesses are progressively in a profoundly competitive environment. Differentiation is key to situating against the competition. The comparison will give benchmarks on the operation of particular ranges as an entirety, producing great significance for vital decisions within the company.

Here are some of the benefits of doing a benchmarking:

- Gain more prominent information and understanding of competitors.

A competitive examination permits to know the circumstance of companies with more encounter within the showcase. The benchmarking will discover who their competitors are, what channels they are in, what they are doing, their methodologies, their qualities and shortcomings, etc. It can be learned how they have come there, the impediments they have overcome, and the victories they have had. If the owner company is the one with the initial encounter, assembly modern competitors will provide you with a new see at what the industry needs.

- Analyze competition in real-time.

Much appreciated to innovations able to know what they are doing in numerous online channels, what catchphrases they utilize most, the foremost viable and wasteful hones, etc.

- Way better insight of the industry.

It's not just which forms are most productive. But from a more common see of the involvement of the company offers in all ranges. If they hone dynamic tuning in, they will know what clients say around the competition and the industry, but particularly almost their company.

- Set New Objectives.

All the data assembled will permit alteration procedures, set a modern activity plan and get new objectives. The competition will drive the business to make strides continuously. Continuously knowing the competition gives the knowledge so that the choices made are constantly well grounded on a natural floor and adapted toward enhancement.

- Distinguish where performance can be progressed.

Benchmarking will moreover offer assistance to understand where we got to the centre and make strides. A front-end comparison of the competition with the company can highlight what is done right and what isn't done right. Looking fundamentally at the competition implies looking similarly at the interior of the organization. The information will deliver a clear see of what should be changed or which process works way better than elsewhere.

- Increment the esteem.

The competition ought to be pondered to realize that conveying value-added items that increment the brand's esteem could be a procedure that can pay off, not just exceptional deals. But moreover progresses things like client preferences. If they screen the arrangement, they will know what clients need and request.

(Wisestep 2019).

The list of the benefits may continue to look to positive effects of conducting a benchmarking in a company; however, it is up to the company to implement the final results into the processes to see the improvement in the desired process/activity.

### **3 Waste Management**

In recent a long time, the security of the environment has ended up a major universal player. Among the current natural issues, squander administration has ended up one of the biggest concerns in industrialized nations. As a result, companies are getting increasingly mindful, and few are unaware of the significance of taking care of the environment.

From the natural and open well-being point of view, the correct administration of waste within the stages taking after its era permits the moderation of negative impacts on the environment, well-being, and weight diminishment on characteristic assets. Reuse and reusing of materials are critical to diminishing importance on settings and other sources of support from which they are disengaged. According to the United Nations (2009), we dump 2.12 billion tons of waste every year.

Also, the life cycle of mass consumer items has been diminished, creating negative results that affect the environment. The product is an impressive increment within the volume of the waste era. The results of waste generation are an issue that has picked up ground by noticing that this can be a characteristic phenomenon in any generation handle. Waste management is hence a vital issue of developing concern to businesses.

Mainly, waste management in the industry is one of the foremost critical issues and is frequently not done legitimately due to lack of information. Waste from industrial forms is, for the most part, substances that contain naturally harmful components. For this reason, the control to be worked out on these squanders must be exceptionally thorough in all zones.

But there are four different types to classify waste: municipal solid waste, industrial waste, agricultural waste, and hazardous waste.

Municipal Solid Waste (MSW), it is more commonly known as trash or garbage—consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. This comes from our homes, schools, hospitals, and businesses. (Environmental Protection Agency 2016.)

Industrial solid waste, it is defined as waste generated by businesses from an industrial or manufacturing process or waste generated from non-manufacturing process or waste generated from manufacturing activities that are managed as separate waste stream. (Olmsted County Minnesota 2018.)

Agricultural Waste, it is waste produced because of various agricultural operations. It includes manure and other wastes from farms, poultry houses and slaughterhouses; harvest waste; fertilizer run-off from fields; pesticides that enter into water, air or soils; and salt and silt drained from fields. (OECD 2001.)

Hazardous waste is the one that may contain toxic substances generated from industrial, hospital, some types of household wastes. These wastes could be corrosive, inflammable, explosive, or react when exposed to other materials. Some hazardous wastes are highly toxic to environment including humans, animals, and plants. (Saleh 19 October 2016.)

There are more types of waste, but these are the main categories where they are divided. "It is our collective and individual responsibility to preserve and tend to the environment in which we all live." – Dalai Lama.

### **3.1 Waste Management in the Industrial Sector**

Talking of industrial waste administration, numerous terrible practices within the world are practiced and thus lead to damage to the environment. Usually, it is not an issue for nations with great economies. However, developing nations present such issues indeed nowadays. Waste exports have been practiced for a long time; although European import and trade rules are clear and include confinements on the materials that can be sell to underdeveloped countries.

There is an international law that controls the cross-border transport of hazardous waste; the Basel Convention, it was promoted by the United Nations in 1989, and entered into force on 5 May of 1992, with the intention of anticipating the transfer of hazardous waste in developing nations. This agreement was signed by Chile on 31 January in 1990, approved by the National Congress, and was published within the Official Diary on 13 October in 1992.

The objective of the Convention is to promote the use of technologies and methods of clean production, diminishment of the movement of dangerous and non-hazardous wastes, avoidance of illicit activity in dangerous wastes, enhancement of specialized capabilities, especially for developing nations and nations with economies in transition.

Now a days 170 countries, part of the United Nations system, agreed to protect the environment and human health from the harmful effects caused by the generation, management, transboundary movements and disposal of hazardous wastes. (Ministerio de Ambiente y Recursos Naturales 2015.)

However, industrial waste sometimes is hard to dispose, not to mention the high costs required to do it in an efficient and effective way with the right measures and processes. For this reason, many companies choose other alternative, instead of doing it by themselves, they opt to the easiest way or even illegal, where they export their hazardous waste to developing countries where they do not have the required measures and treatments to dispose the hazardous wastes, consequently, was born the definition of "*Toxic Colonism*".

This term was coined by Jim Puckett, a Greenpeace activist, in 1992. It refers to the export of toxic waste from the West to third world countries (Safeopedia 2018.) Africa is the principal target country of this unethical practice, but is not the only one, this has led to colossal dumpsites around the world which affect not only the environment but the health of entire communities.

According to Kid Krunk (2016), here are some of the largest dumping grounds of the world:

- Ghana, Africa, where almost all the e-waste from all around the world is going to stop.
- Manila, Philippines; Where they found 50 containers from Canadian precedence full of toxics that was supposed to be plastic to recycle.
- Bangladesh: According to studies by the Environment and Social Development Organization, more than 83% of child workers are exposed to toxic substances related to e-waste recycling in Bangladesh. As a result, over 15% of these children die each year. Not to mention the millions of tons of old ships that are sent every year.
- Mexico: Now is not happening anymore, but during the 1980's a lot of toxic waste was hidden in cargo trucks, originated from United States, ended up in unregulated landfills.



Illustration 3. Activists protesting against Canada (Greenpeace year unknown)

The list of unethical and illegal practices around the world can keep going on therefore the best solutions are those in which locally it is chosen what to do, without any confinement on which technologies to use and where to treat waste, but ensuring a clean handle and transport, that anticipates harm and environmental impacts.

### 3.2 Waste Management in Industrial Companies in Mexico

The quickened development of mechanical action in numerous nations, the destitute administration of numerous chemicals and the insufficient transfer of harmful squander, has expanded the introduction of the populace and common biological systems to possibly harmful substances. In 2012, it was estimated that in only 49 countries classified as low- and middle-income, about 125 million people were exposed to toxic waste pollution (Black Smith Institute and Green Cross, 2012).

The cumulative volume of Hazardous Waste generated in the country during the period 2004-2014 and the number of companies generating it are shown in the table below. (Table 1). Both the volume and the number of companies are obtained from the records and information provided by the companies registered in the Hazardous Waste Generators Register (PGRP) to the Semarnat. According to the PGRP, between 2004 and 2014 the 93 355 registered companies generated 2.19 million tons. (Semarnat 2017.)



Table 1. Estimates of Hazardous Waste in Mexico, April 2015 (Dirección General de Gestión Integral de Materiales y Actividades Riesgosas. Semarnat. Mexico, April 2015)

Estimates of hazardous waste in Mexico		
Period	Estimate waste (Millions of tons accumulated)	# of Companies
2004-2009	1.7	52784
2004-2011	1.92	68733
2004-2012	1.96	75562
2004-2013	2.4	84279
2004-2014	2.19	93355

As can be seen in the table, there is a notable increase year after year in hazardous waste due to the companies in Mexico, not to mention that not all of them are registered in the official platform in Mexico. According to the type of generating industries, in the period 2004-2014, The chemical industry produced 211 886 tons (15.7% of the total generated), the automotive Industry 195 101 tons (14.4%), the metallurgical Industry 190 229 tons (14.1%) and oil and petrochemical industry 138 957 tons; 10.3%). Appendix 1

### 3.2.1 Official Mexican Norms for Hazardous Management

Every company needs to submit a waste management plan for the Mexican government, which must explain to details the objective of the company in terms of waste management; the process, the materials used, the quantities and an emergency plan regulated by the Regulation of the General Law for the Prevention and Management Integral of Residues, the NOM's and the General Law on Ecological Balance and Protection of the Environment.

These laws are of public order and social interest and have as an objective to promote sustainable development, among others. The basis for guaranteeing the right of everyone to live in an environment suitable for their development, health, and well-being; defining the principles of environmental policy and the instruments for its implementation; preservation, restoration, and improvement of the environment, as well as the prevention and control of air, water, and soil pollution.

### 3.2.2 Official Process in Mexico

The Mexican government regulates the authorization of the processes for the proper management of waste in the industries. To obtain approval, an application must be submitted

in a format that the General Secretariat issues with the general data of the company, signature of the legal representative.

They must present a waste management plan containing a description and identification of each hazardous waste intended to be handled, where their physical, chemical, or biological characteristics are indicated, and an estimated annual amount of management. The estimated annual capacity of the installations where the management activity is intended to be carried out, an indication of the use of the authorized soil in the area where it is designed to be installed, the activity that is intended to be carried out, the start date of operations and the estimated investment of the project.

The actions to be taken when the hazardous waste arrives at the facility where the respective activity will be carried out, including the unloading, and weighing of the trash, as well as the entry and exit movements of the warehouse areas. The type of storage, packaging or bulk, and storage capacity for hazardous materials within the premises before their specific handling. Also, the characteristics of the waste generated during the handling operation, the estimated amount to be generated, the handling that will be given to them, and the proposed insurance or financial guarantees in case of an accident.

Once the information has been submitted, it is provided to the Secretariat of Mexico and its officials in order to obtain the waste management certification.

(Reglamento de la Ley General para la Prevención y Gestión de los Residuos 2006.)

### **3.2.3 Hazardous Material Classification**

One crucial step of the process is to determine/classify if the material is hazardous according to the NORMA Oficial Mexicana (NOM-052-SEMARNAT-2005), which establishes the characteristics, procedure and lists of hazardous materials for accurate classification.

Waste is hazardous if it has at least one of the following characteristics: corrosivity, reactivity, explosiveness, environmental toxicity, flammability, biological-infectious.

A material is Corrosive when: It is a liquid and has a P.H. of less than or equal to 2.0. When it is solid, when mixed with distilled water, it has a P.H. of less than or equal to 2.0, when it is a non-aqueous liquid capable of corroding carbon steel at a speed of 6.35 millimetres or more per year at a temperature of 55 Celsius degrees.

It is Reactive when a representative sample has any of the following properties: It is a liquid or solid that, after contact with the air, is ignited within less than five

minutes without an external source of ignition. When contacted with water reacts spontaneously and generates flammable gases in quantity greater than 1 litre per kilogram of waste per hour. It is a waste that in contact with air and without a supplementary energy source generates heat. Suppose It has in its constitution cyanide or sulphides releasable. In that case, when exposed to acid conditions, it generates gases in quantities greater than 250 mg of hydrocyanic acid per kg of residue or 500 mg of hydrosolic acid per kg of residue.

It is Explosive when capable of producing a detonating or explosive reaction or decomposition or in the presence of an energy source or if heated under confinement. This characteristic should not be determined by laboratory analysis, so identifying this characteristic must be based on knowledge of the origin or composition of the residue.

Environmental Toxic when the PECT extract, obtained by the procedure established in NOM-053-SEMARNAT, contains any of the toxic constituents listed in Table 2 of this Standard at a concentration more remarkable than the limits indicated therein. Appendix 2

It is considered Flammable when it is a liquid or a mixture of liquids containing solids in solution or suspension that has a flashpoint below 60.5°C. It is not liquid and can cause frictional fire, moisture absorption or chemical changes spontaneous at 25°C. It is a gas that, at 20°C and a pressure of 101.3 kPa, burns when it is in a mixture of 13% or less by volume of air or has an air flammability range of at least 12% without importing the lower flammability limit. If It is an oxidizing gas that can cause or contribute more than air, to the combustion of other material.

(Diario Oficial 2006, II Section.)

## 4 Case Study: Rosenberger Waste Management Process

This chapter refers to the commissioner company, and the company studied for the benchmarking analysis. Mention will be made of what the company is dedicated to, the types of materials with which it is commonly worked, its waste management processes, and its difference. The benchmarking type applied to this research will be the active type, as it is not the same type of industry, but the process can be compared between both.

### 4.1 Commissioned Company: Rosenberger

Rosenberger group is a 25-year-old manufacturer of high-quality connectors and cable assemblies for high-tech companies in different industry sectors like automotive, mobile and telecommunications, data technology, and aerospace.

Its headquarters in Germany, with a global network of over 11,800 employees, focuses on cutting-edge technology and highly efficient manufacturing processes. (Rosenberger 2017.) They are an international company with locations worldwide; besides Germany, they have locations in France, Italy, Hungary, and Mexico. Rosenberger Mexico is located in Parque Industrial Milenium, Apodaca, Nuevo León, Mexico.



Illustration 4. Nuevo León Location in the Map (Mexico Real 2017)

The company is in a strategic geographic location, Nuevo León, a state in northeastern Mexico that shares a border with the United States. Its strategic location makes the destination an essential logistics centre and ideal for conducting business and successful events. In addition, a significant network of roads and highways converge in the city that allows it to be very close to strategic towns in Mexico and the southern United States. It is a national leader attracting foreign direct investment and a city with more than 3,500 foreign companies established. Nuevo León contributed 7.5% of the national Gross Domestic Product (GDP) in 2019. (Flores 10 October 2019.)

Rosenberger OSI has settled their primary environmental objectives, they play a huge role in the company, they want to be responsible for every activity they perform. Some of their principal goals are:

- Maintenance and preservation of natural resources
- Avoidance, reduction, recycling and proper disposal of contaminating emissions and waste.
- Prevention of incidents hazardous to the environment and limitation of the potential dangers.

(Rosenberger OSI 2017.)

According to the Rosenberger OSI (2017.), every employee in their company performs activities that rely on the environment; therefore, they keep the continual improvement of each activity while cooperating in the realization of their overall objective.

### **Waste Management Process of Rosenberger**

The actual waste management process from Rosenberger is the one illustrated below. The most common materials which the company works on are copper, plastic, cardboard, wood, fibre optics, rubber, steel, sandpapers, yarn, greases and oils, motors, polyethene and tetraflute.

Rosenberger's management involves planning and defining procedures within the company considering technical, economic, legal, and administrative aspects to ensure sound governance. Management includes generation, segregation, internal movement, transient picking, collection, transportation, temporary storage, treatment and final disposition.

Once the production process is over, the waste becomes classified between recyclable and non-recyclable; they organize the non-recyclable materials into hazardous waste.

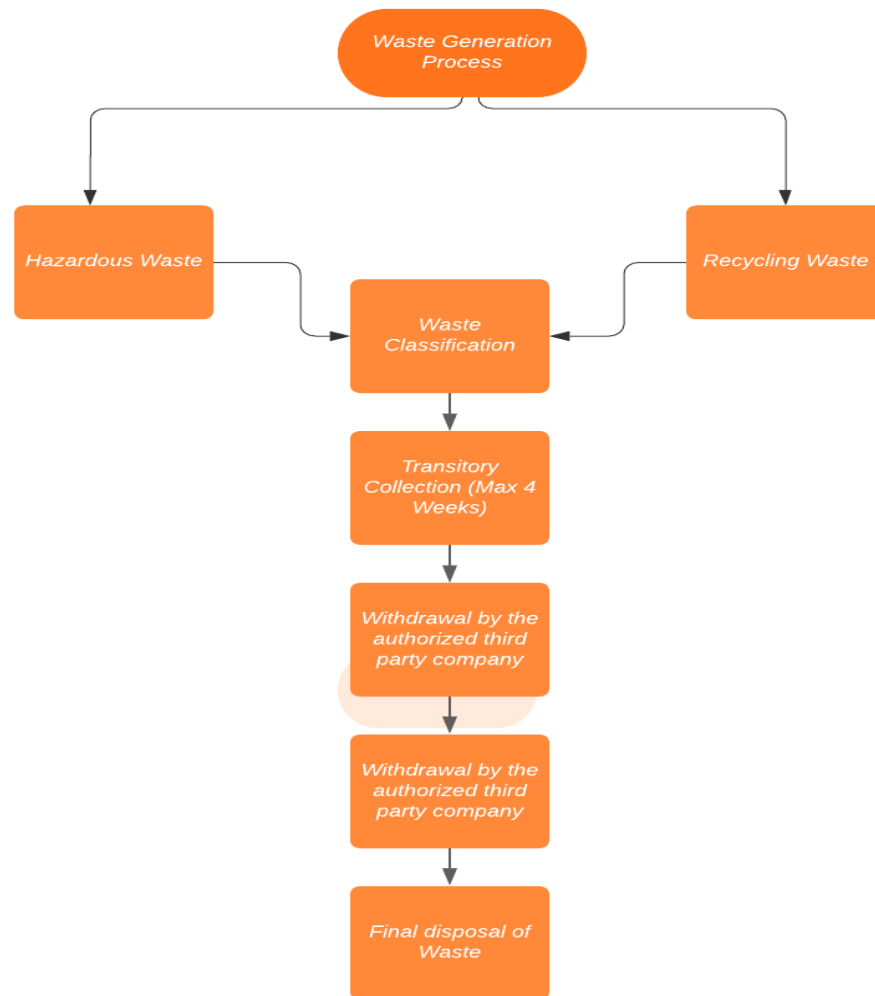


Figure 5. Rosenberger Actual Waste Management Process (Palomino 18 November 2020.) Appendix 3

I. Pre-generation stage

The purchasing area must classify the hazardous and recyclable material in a list before requesting purchases, taking control over which size they pass and which procedures are intended.

II. Generation stage.

The person responsible for each generating unit (production lines) must place the storage container or container according to the physical condition and the degree of compatibility of the waste, pack or deposit the waste in containers or containers that meet the requirements of safety and classify and label the waste.

III. Internal storage stage of the unit

The responsible person for each generating unit (the same as in the previous step) must store the waste in safe conditions and areas. These containers are adequately identified until they are taken to temporary storage. These containers are next to the production lines in barrels (8 meters away) labelled according to the type of hazardous waste and

cartons and plastics go directly to a container at the end of the production line, where at the end of each week they are transferred to the general waste of the company. The barrels can stay inside the company for a maximum of 4 weeks.

#### IV. Transport stage

The residues will go to the collection centre, empty containers containing hazardous waste, and any objects that have come into contact with hazardous waste. Record in the log of dangerous waste storage the name of the trash, the weight, the characteristics, area or process of generation and date of entry and sign of the third-party company.

#### V. Final disposal stage

The head of the collection centre receives the waste and proceeds to register the waste according to the information required in the chain of custody. Delivery of the final disposal manifests of the waste, and receive the document issued after the entry of the safety landfill.

The interview of the supervisor of the process stated and described the main activities performed inside the company. They do not understand what happens with the residues after it is delivered to the third-party company. (Palomino 18 November 2020.)

### **4.2 Benchmarked Company: Oeschler**

Oechsler is an international company established in 1864, and the company has, throughout more than 150 a long time, it has developed into one of the international driving suppliers of plastics technology. They have locations in Europe, Asia and America, and more than 3,100 employees. (Oechsler 2019.)

Oechsler Mexico is located in a newly established, customized, rented building (built-to-suit) in the new Industrial Park "Parque Tecnológico Innovación ", Querétaro, Querétaro.

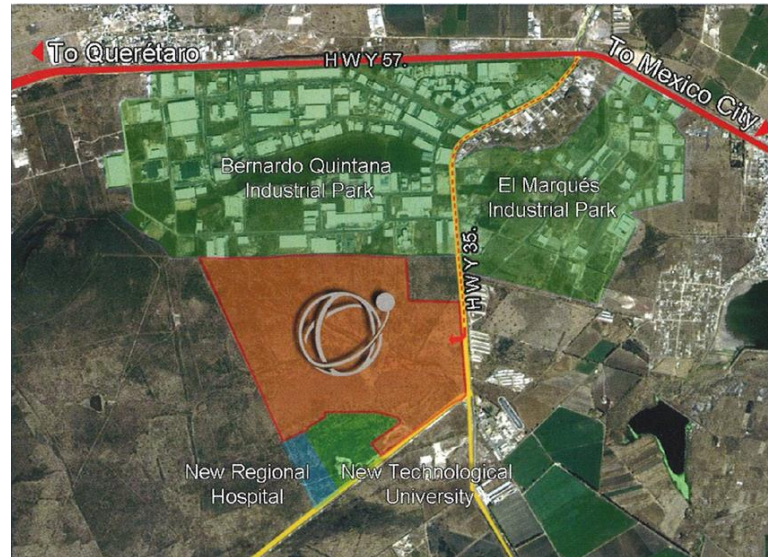


Illustration 5. Oechsler Location in the map (Google Maps 2021)

Oechsler company is dedicated to the injection of plastic for the manufacture of automotive components. It generates within its productive process different types of waste considered as hazardous, mainly developed by preventive and corrective maintenance activities or services provided to machinery, such as in the manufacture of other plastic parts for the automotive industry, they are given attention and importance given the degree of risk they can cause to the environment and human health.

For this reason, the plan for the management of hazardous waste was developed, which details the generation line, the control to which the hazardous waste generated in the company's operational areas, the type and conditions of temporary storage are subjected, collection and transport until final disposal complying in the federal scope with the corresponding legal framework, which mentions among other things the obligations that as a hazardous waste company must comply with before the competent authority in Mexico, such as submitting a dangerous waste management plan.

### **Oechsler Waste Process**

The information for Oechsler Waste Process is based on desktop research. It cannot be mentioned the names of the employees or share their official documents for terms of confidentiality. The information will be as straightforward as possible. The company must first set the objectives of the plan for optimal results.

1. Encourage the minimization of waste generation, mainly those generated in large volumes.
2. Maximize the valuation or use of waste to reduce the volume of what is currently sent to the final disposal.



3. Reduce the cost associated with waste management.
  4. Comply with applicable laws.
  5. Eliminate or minimize the impacts generated by waste on the environment and the health of living things.
- (Waste Management Specialist 24 November 2020.)

## Waste Management Process of Weschler

### I. Identification and registration.

The management of hazardous waste in each of the areas of the company begins with the activity of identifying them according to the description of the table of waste generated within the company; therefore, the personnel of the generation areas must have the technical capacity to identify when waste is dangerous according to its characteristics and its area or generation activity to make the corresponding separation. Appendix 4

Recyclable waste such as the carton passed directly to the container and was collected every month by the buyer, who weighed the waste. Every kilogram of carton 1.60 mexican pesos was paid.

### II. Internal waste collection.

Hazardous waste generated in the different production areas and auxiliary work services are collected in 9 temporary storage stations in separate containers, which have a label indicating the type of waste to be contained. Appendix 5

It is important to note that these stations are located at strategic points of generation within the plant.

### III. The temporary storage of hazardous waste.

They are stored for a period not greater than 21 days before their collection by the supplier "Organic Industrial Transport" for shipment to the collection centre. The company's hazardous waste manager must verify that dangerous waste containers are in correct condition and identified at the generation site and temporary hazardous waste storage.

Conditions to be verified by the manager:

- Containers must have a lid.
- Record all information on the container's journal and the container's label.
- Containers should store a maximum of 90% of their capacity to avoid spillage.
- Avoid mixing hazardous and non-hazardous waste in waste containers or final disposal sites.
- Verify that incompatible hazardous waste is handled separately.

The storage areas should be considered for the establishment of official Mexican standards.

- Be separated from the areas of production, services, offices, and storage of raw materials or finished products.

Compliance analysis: The warehouse does not comply, as it is sharing space with the maintenance warehouse.



Illustration 6. Warehouse of hazardous waste shared with maintenance warehouse (Forma de Manejo Integral Oechsler 2019.)

Corrective action: Place physical separation between the two warehouses



Illustration 7. Hazardous waste Warehouse separated from maintenance warehouse and production warehouse (Forma de Manejo Integral Oechsler 2019.)

For the registration and control of hazardous waste, Oechsler Mexico S.A. DE C.V. has a physical journal, as well as in a digital manner of hazardous waste, which establishes the following: Appendix 6

- Name of the waste and quantity generated.
- Hazard characteristics.
- Area or process where it was generated.

- Arrival and departure dates of the temporary hazardous waste storage.
- Details of the handling phase following the outlet of the warehouse, storage area or transfer.
- Name or "razón social" and authorization number of the service provider to whom the management of such waste is entrusted.
- Name of the technical manager of the journal.

#### IV. Hazardous waste transfer, collection centre and final disposal.

The company must verify that :

- Service providers for the collection and transport of hazardous waste are sealed and signed.
- Materials must be labelled appropriately.
- Have a contingency plan with the necessary equipment in case of leaks or spills.
- Have trained personnel for collection.
- Observe the compatibility characteristics of the transport of hazardous waste.
- If it is any infectious material, it cannot be transported with any other type of hazardous waste.

Oechsler has few measures in spills or risk situations, and they have wood sawdust for the oils. In case a controlled quantity is spilt, it is thrown into the waste for absorption and control. After this, the area is cleared, and the hazardous waste managers clean the room with the necessary chemicals to decontaminate the place. If the event is out of control, a panic button is pressed, and authority is subsequently called.

After the company treats the waste as oil for the machines, they return it to the company with a certificate where it guarantees that it was treated to be reused in the machinery. Finally, the process is finished, and the third party takes care of the final disposal of the hazardous waste.

OECHSLER 2019. Collaboration with OECHSLER MX Company permit the PDF File of the waste management process. (confidentiality agreement).

## 5 Conclusions and Suggestions

This chapter mentions the conclusions of the research and the recommendations based on the results for future research or improvements in the company. The study finishes in analyzing the data, and the implementations will be up to the commissioned company.

### 5.1 Conclusions

In conclusion, the Oeschler and Rosenberger processes comply with the required standards of the Mexican government. However, as we can note, Oeschler has a much more defined process, in which more personnel are involved in the tasks to be performed within the process. They also seek the areas of opportunity within the same process and the corrective actions to be taken.

Summary of the benchmarking results data		
<i>Benchmarking factors</i>	<i>Rosenberger</i>	<i>Oeschler</i>
Ability to improve	YES	YES
Time spend	YES	NO
Financial Savings	NO	YES
Operational improvements	YES	NO
The YES/NO response represents the areas of opportunity to improve.		

The benchmarking factors were based on the ability to improve for the company, time spent during the process, the financial savings that can get from from the process, and the operational improvements that can be made.

Ability to improve refers to the option of improving the entire process in the company, Rosenberger needs to improve some of the steps, on the other side, Oeschler had to improve however they noticed the current mistake and fix it.

For the time spend, Rosenberger spends more time dealing with the process due to the lack of employees that work specifically for the waste management process. While Oeschler has its designated employees specifically for this process.

In the financial savings, Rosenberger could save more money from the process with new improvements, while Oeschler is reusing their materials and try to take an advantage from their own waste.

Finally in the operational improvements, Rosenberger could improve the operational process, does not mean it will reduce costs, but it means everything can be in order with the right management in order to avoid possible risks from the Mexican authority. Oeschler has a good order and record of every single activity in the process.

In addition, a benchmarking study is not quick to perform. It is vital to first understand the desired process of improvement before studying the competition. It may be feasible to scan and analyze the results of the process. In this way, you can notice the areas of opportunity within the company itself and the competition and conclude the areas of overcoming to be in continuous improvement.

It is essential to mention that the competition that is more advanced or has more experience in the industry is the one that must be studied in a benchmarking analysis, as this will acquire the ideas for the best practices. This tool usually helps companies that are still growing, but there is never a limit for the continuous improvement." *Even perfection has room for improvement*" – Try Warner.

## **5.2 Suggestions for stakeholders**

The suggestions for Rosenberger, the commissioned company, are the following:

- The waste management process should be more detailed than just the basic plan required to comply with the laws.
- There should be a designated staff or employees just for the waste management process instead of involving employees from other departments in the process.
- A contingency plan should be developed in case of risk situations to avoid fines from the local authorities.
- A workshop on waste management can be given to avoid process delays when sorting and workers within the process know-how to classify materials appropriately.
- An appropriate journal must be created to have an accurate record when receiving, sorting, and delivering waste; this will favour the company in an audit.
- Look for ways in which materials can be recycled or reused. If this cannot be done, they can look for a supplier to whom it can be sold some recyclable waste and profit from it.
- Analyze the facilities and note areas that do not comply with the required and enhance the measures that need improvement; as mentioned in the Rosenberger process, the temporary storage should not be close to production. In case of an audit by the state, it will be sanctioned with a fine, but it can be avoided by studying and checking the law is reviewed and its requirements.

These are some of the corrective measures which can be enhanced inside the company; however, the decision is up to the commissioned company, so there is no way to measure the improvement in the process until it is fully applied. This is a guide for them to notice the possible areas of improvement in their company and prevent some sanctions and potential risks.

## References

A. C., Fernando. 2009. Business Ethics. An Indian Perspective.

Aeuroweb 2020. Que es Benchmarking. URL: <https://www.aeuroweb.com/benchmarking/>. Accessed: 18 April 2021.

BSR. 2018. The State and Future of Sustainable Business in 2018.

URL:<https://www.bsr.org/en/our-insights/blog-view/csr-sustainability-business-trends-now-and-the-future>. Accessed 20 October 2020.

Business New Daily 2021. The Business of Benchmarking in Business Operations. URL:

<https://www.businessnewsdaily.com/15960-benchmarking-benefits-small-business.html>. Accessed: 12 January 2021.

Carroll, A. B. 2016. Carroll's pyramid of CSR: taking another look. International journal of corporate social responsibility.

Carroll, A. B.1999. Corporate social responsibility: Evolution of a definitional construct. Business & Society.

Cato, M. 2009. Green Economics- An introduction to theory, policies, and practices.

ProQuest Ebook Central, pp. 175.

URL:<http://ebookcentral.proquest.com/lib/haaga/detail.action?docID=3338333>.. Accessed 21 October 2020.

Chron 2021. How to Use Benchmarking Techniques Effectively.

URL:<https://smallbusiness.chron.com/use-benchmarking-techniques-effectively-13083.html>. Accessed: 20 April 2021.

CONE 2017. 2017 Cone Communications CSR Study.

URL:<https://www.conecomm.com/research-blog/2017-csr-study>. Accessed 20 October 2020.

Corporate Finance Institute 2018. Business Ethics.

URL:<https://corporatefinanceinstitute.com/resources/knowledge/other/business-ethics/>. Accessed: 20 April 2021.

Eco Life 2011. A guide to green living. URL: <http://www.ecolife.com/define/waste-management.html>. Accessed: 03 March 2021.

Ecoefficiency 2017. Benefits of Becoming a Sustainable Business. URL: [http://www.ecoefficiency.com/benefits\\_becoming\\_sustainable\\_business.html](http://www.ecoefficiency.com/benefits_becoming_sustainable_business.html). Accessed 20 October 2020.

Environment + Energy Leader 2016. 6 Benefits of Becoming a Sustainable Business. URL: <https://www.environmentalleader.com/2016/03/6-benefits-of-becoming-a-sustainable-business/>. Accessed 20 October 2020.

European Parliament 2015. Circular Economy: Definition, Importance and Benefits. URL: <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>. Accessed 3 March 2021.

Expense Reduction Analysis 2021. Las Empresas que gestionan correctamente sus residuos reducen sus costes de tratamiento. URL: <https://es.expensereduction.com/noticias/correcta-gestion-de-residuos/>. Accessed: 20 April 2021.

Global Alliance for Buildings and Construction 2018. Global Status Report

Goncharuk, Anatoliy & Getman, Maryna. 2014. pp.21 Benchmarking to improve a strategy and marketing in pharmaceuticals. *Benchmarking: An International Journal*.

HotStats 2018. The Story of Benchmarking: History, Processes and Practice. URL: <https://www.hotstats.com/hotel-industry-resources/the-story-of-benchmarking-history-processes-and-practice>. Accessed 20 April 2021.

InfoBae. 17 July 2019. Tragedia ecológica: relacionan muerte de animales con derrame químico de Grupo México. InfoBae Blog. URL: <https://www.infobae.com/america/mexico/2019/07/17/inadmisibles-accidentes-de-derrames-quimicos-de-grupo-mexico-se-aplicara-la-ley-senalan-en-la-semarnat-e-investigaran-posible-ecocidio/> . Accessed: 02 January 2021.

Management Study Guide 2015. Fiel Research. URL: <https://www.managementstudyguide.com/field-research.htm>. Accessed: 02 February 2021.



Maryville U.2019. The Importance of Environmental Awareness When Running a Business. URL:<https://online.maryville.edu/blog/importance-of-environmental-awareness-when-running-a-business/#:~:text=An%20environmentally%20aware%20business%20considers,which%20the%20business%20can%20thrive>. Accessed 20 October 2020.

OBERLO 2017. What is Benchmarking?. URL:<https://www.oberlo.com/ecommerce-wiki/benchmarking>. Accessed 20 April 2021.

OECD (2001), Corporate Social Responsibility: Partners for Progress, OECD Publishing, Paris. URL: <https://doi-org.ezproxy.haaga-helia.fi/10.1787/9789264194854-en>. Accessed 15 October 2020.

OECHSLER AG 2019. Sustainability. URL: <https://www.oechsler.com/en/company-group/sustainability/>. Accessed: 18 January 2021.

---

OECHSLER 2019. Waste Management Process in OESCHLER MX.

Oy Benchmarking Ltd 2016. Introducing Benchmarking, ProQuest Ebook Central,pp 24. URL: <http://ebookcentral.proquest.com/lib/haaga/detail.action?docID=4883137>. Accessed 15 October 2020.

Palomino, E. 18 November 2020. Supply Chain Manager. Rosenberger OSI. Interview. Mexico.

Pierre J. Richard, Devinney T., George S. Yip, and Johnson G. 2009. Journal of Management pp.35-40.

Richardson, B. 2013. Benchmarking Proses, Oy Benchmarking Ltd. URL: <http://ebookcentral.proquest.com/lib/haaga/detail.action?docID=4883140>. Accessed 21 October 2020.

Richardson, R. 2013. Perspectives from Ecological Economics. Michigan State University Press pp. 10-21. URL: <http://ebookcentral.proquest.com/lib/haaga/detail.action?docID=3338333>. Accessed 21 October 2020.

Sustainable Development Goals. 2015. Green Economy. URL:  
[https://sustainabledevelopment.un.org/index.php?menu=1446#:~:text=For%20example%2C%20UNEP%20has%20defined,%22%20\(UNEP%2C%202011\)](https://sustainabledevelopment.un.org/index.php?menu=1446#:~:text=For%20example%2C%20UNEP%20has%20defined,%22%20(UNEP%2C%202011).). Accessed 17 October 2020.

The New Climate Economy 2018. The 2018 Report of the Global Commission on the Economy and Climate. URL: <https://newclimateeconomy.report/2018/>. Accessed 20 October 2020.

United States Environmental Protection Agency 2020. Basics of Hazardous Waste. URL: <https://www.epa.gov/hw/learn-basics-hazardous-waste>. Accessed: 20 April 2021.

University of Wisconsin 2018. The Triple Bottom Line. URL: <https://sustain.wisconsin.edu/sustainability/triple-bottom-line/> . Accessed 21 October 2020.

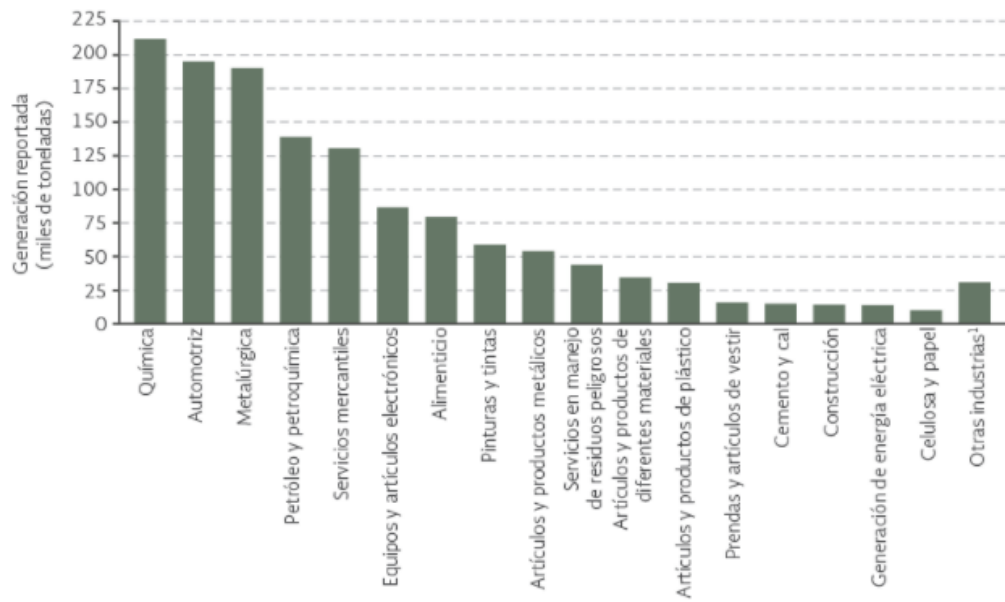
Wisestep 2019. Benchmarking: Types, Process, Advantages & Disadvantages. URL:<https://content.wisestep.com/benchmarking-types-process-advantages-disadvantages/>. Accessed 28 March 2021.

World Health Organization 2018.WHO Global Benchmarking Tool (GBT) for evaluation of national regulatory systems. URL: [https://www.who.int/medicines/regulation/benchmarking\\_tool/en/](https://www.who.int/medicines/regulation/benchmarking_tool/en/). Accessed: 20 April 2021.

## Appendix

### Appendix 1. Principal Generate of Hazardous Materials Industries

Figura 7.15 | Generación de RP reportada por los principales tipos de industrias generadoras, 2004 - 2014



## Appendix 2. Maximum Limits for PECT Toxic Waste by Materials

LIMITES MAXIMOS PERMISIBLES PARA LOS CONSTITUYENTES TOXICOS EN EL EXTRACTO PECT		
No. CAS <sup>1</sup>	Contaminante	LMP <sup>2</sup> (mg/L)
<b>CONSTITUYENTES INORGANICOS (METALES)</b>		
7440-38-2	Arsénico	5.0
7440-39-3	Bario	100.0
7440-43-9	Cadmio	1.0
7440-47-3	Cromo	5.0
7439-97-6	Mercurio	0.2
7440-22-4	Plata	5.0
7439-92-1	Plomo	5.0
7782-49-2	Selenio	1.0
<b>CONSTITUYENTES ORGANICOS SEMIVOLATILES</b>		
94-75-7	Acido 2,4-Diclorofenoxiacético (2,4-D)	10.0
93-72-1	Acido 2,4,5-Triclorofenoxipropiónico (Silvex)	1.0
57-74-9	Clordano	0.03
95-48-7	o-Cresol	200.0
108-39-4	m-Cresol	200.0
106-44-5	p-Cresol	200.0
1319-77-3	Cresol	200.0
121-14-2	2,4-Dinitrotolueno	0.13
72-20-8	Endrin	0.02
76-44-8	Heptacloro (y su Epóxido)	0.008
67-72-1	Hexacloroetano	3.0
58-89-9	Lindano	0.4
74-43-5	Metoxicloro	10.0
98-95-3	Nitrobenceno	2.0
87-86-5	Pentaclorofenol	100.0
8001-35-2	Toxafeno	0.5
95-95-4	2,4,5-Triclorofenol	400.0
88-06-2	2,4,6-Triclorofenol	2.0
<b>CONSTITUYENTES ORGANICOS VOLATILES</b>		
71-43-2	Benceno	0.5
108-90-7	Clorobenceno	100.0
67-66-3	Cloroformo	6.0
75-01-4	Cloruro de Vinilo	0.2
106-46-7	1,4-Diclorobenceno	7.5
107-06-2	1,2-Dicloroetano	0.5
75-35-4	1,1-Dicloroetileno	0.7
118-74-1	Hexaclorobenceno	0.13
87-68-3	Hexaclorobutadieno	0.5
78-93-3	Metil etil cetona	200.0

### Appendix 3. Rosenberger interview to Engineer Elizabeth Palomino, Supply Chain Manager.

<b>Rosenberger</b>
<i>Interviewed Person</i>
Elizabeth Palomino Engineer
<i>Position</i>
Supply Chain Manager
<i>Activities to be performed</i>
She used to be the manager of the manufacturing processes, so she has deep knowledge of the waste management processes. Now she is a Supply chain manager in Rosenberger OSI
<i>Where does the waste management process starts?</i>
The process begins from the purchase of the materials, are classified by the specialists the list of raw materials that can be hazardous to the environment. In my case, I see production waste directly. Once it became a waste, those operating the lines were responsible for classifying non-hazardous to special handling
<i>Which were the steps of the waste management process?</i>
Once it becomes waste, is classified as recyclable or hazardous material, then passes depending on its classification to the containers in the internal storages within the company (these containers are approximately 8 meters away from the production lines), in case the hazardous ones, are stored in special containers depending on the type of material to be saved and labelled the material according to its classification. The maximum these material can stay inside the plant is for 4 weeks, then it proceeds to the next stage
Then it comes the transportation stage:the waste passes to the collection center empty and also the containers that have contained hazard-ous waste and, any objects that have come into contact with a hazardous waste. Then a journal must be filled specifying the hazardous waste storage details; the name of the waste, the weight, the characteristics, area or process of generation and date of entry and sign of the third-party company. This is mandatory for the comply with the regulations in Mexico and in case of an audit this must be presented to the authorities.
Final disposal stage: The employee of the collection center, in this case we work with Sanirent, receives the waste and proceeds to the registration of the waste, they have an own journal as well and they need to sign ours once they check our data filled and the truck goes. They proceed to final disposal and once the wastes has been treated and finished its life cycle they issue a new document which guaranteed the waste was treated safely in a landfill.
<i>Which are the materials they commonly work with?</i>
We usually work with copper, plastic, cardboard, wood, fiber optics, rubber, steel, sandpapers, yarn, greases and oils, motors, polyethylene and terraflat. Some of the materials that need special treatment or handling is the steel, the copper, the greases and rubber.
<i>Is there a step during the process that helps reduce costs?</i>
We try to use energy from natural resources but not in the waste management process.

Do you teach any training workshops for waste management?
No, because the company usually hires engineers that have previous knowledge of the topic if they are going to be designated to the area or the other employees help between each other.
Do you have any emergency plans in case of any hazardous waste spillage?
In case there is a spill we call to the local authorities in case of an emergency but by far we have never had a case of emergency
What is the approximate time of waste management process from which it leaves production?
Depends on the material but the waste can not be more than 4 weeks inside the manufacturing warehouse and after that it takes an average of 3 weeks to receive the official document from the third party company, where it mentions that the disposal was efficiently done.
Do you need to comply with any government laws?
Yes, We must follow the "Reglamento de la Ley General para la Prevención y Gestión de los Residuos"
Do they have employees hired only for waste management within the company?
Not only for that activity, usually they perform different activities because is not a daily activity that requires a lot of time.

## Appendix 4. Description of the hazardous material and designated areas



OECHSLER MÉXICO S.A. DE CV  
Carretera Estatal 435 KM 2+100 Int. 76 | Parque  
Tecnológico Insurgentes Querétaro |  
El Marques | Toluca-Querétaro | MÉXICO

### 6.- FORMA DE MANEJO (MANEJO INTEGRAL)















#### 6.1.- IDENTIFICACION Y REGISTRO

El manejo de los residuos peligrosos generados en cada una de las áreas de la empresa, inicia con la actividad de identificación de los mismos de acuerdo a la descripción de la tabla siguiente, por lo que el personal de las áreas de generación deberá tener la capacidad técnica de identificar cuando un residuo es peligroso de acuerdo a sus características y su área o actividad de generación para hacer la separación correspondiente.

En la siguiente tabla se mencionan los tipos de residuos que se genera en cada área:

No.	DESCRIPCION DEL RESIDUO PELIGROSO	AREA
1	o-Diclorobenceno/Fenol+Mucosol+Resina+Acetona	LABORATORIO
2	Trapos y Guantes contaminados con aceites, grasas, solventes.	MAGNA, BOSCH, CUMMINS, ENSAMBLE EPB, ENSAMBLE EPB NUEVA GENERACIÓN, MANTENIMIENTO, MOLDES
3	Lámparas SLIM usadas.	MANTENIMIENTO
4	Filtros de aceites usados.	MANTENIMIENTO
5	Agua con aceite y detergente.	MOLDES
6	Residuos de thomers.	ENSAMBLE EPB
7	Pilas usadas.	MANTENIMIENTO
8	Sólidos impregnados de silicón (trapos, envases).	CUMMINS
9	Sólidos impregnados de resina (trapos, envases).	CUMMINS
10	Agua con detergente y residuos de fibra de vidrio.	MAGNA
11	Resina Caduca.	CUMMINS
12	Silicón Caduco.	CUMMINS
13	Contenedores vacíos.	CUMMINS, MANTENIMIENTO, MOLDES, ENSAMBLE EPB NUEVA GENERACIÓN
14	Biológico infeccioso-NO ANATOMICO	ENFERMERIA
15	Biológico infeccioso- PUNZOCORTANTES	ENFERMERIA
16	Fibra de vidrio contaminada.	ENSAMBLE EPB, ENSAMBLE EPB NUEVA GENERACIÓN
17	Disolvente Usado	CUMMINS
18	Lodo Contaminado	MAGNA
19	Acetate Usado	MANTENIMIENTO

## Appendix 5. Labels for identifying type of waste

PRODUCTO QUÍMICO				RESIDUO QUÍMICO		
				RESIDUO BIOLÓGICO		
NOMBRE			CÓDIGO			
PRECAUCIONES ESPECIALES						
RESPONSABLE		EDIFICIO		EXT.		
FECHA DE ENVASADO		CANTIDAD (Kg y/o Lt)				
DEPENDENCIA Y/O LABORATORIO						
ROTULO DE TRANSPORTE		TIPO DE RESIDUO	LÍQUIDO SÓLIDO	TRATAMIENTO		
Marcar con una X según corresponda						
						
Gas Inflamable	Gas No Inflamable	Gas Tóxico	Inflamable	Sólido Inflamable	Espontáneamente Combustible	Peligroso cuando se humedece
						
Oxidante	Peróxido Orgánico	Sustancia Tóxica	Sustancia Infecciosa	Corrosivo	Misceláneo	Peligroso para el Medio Ambiente



