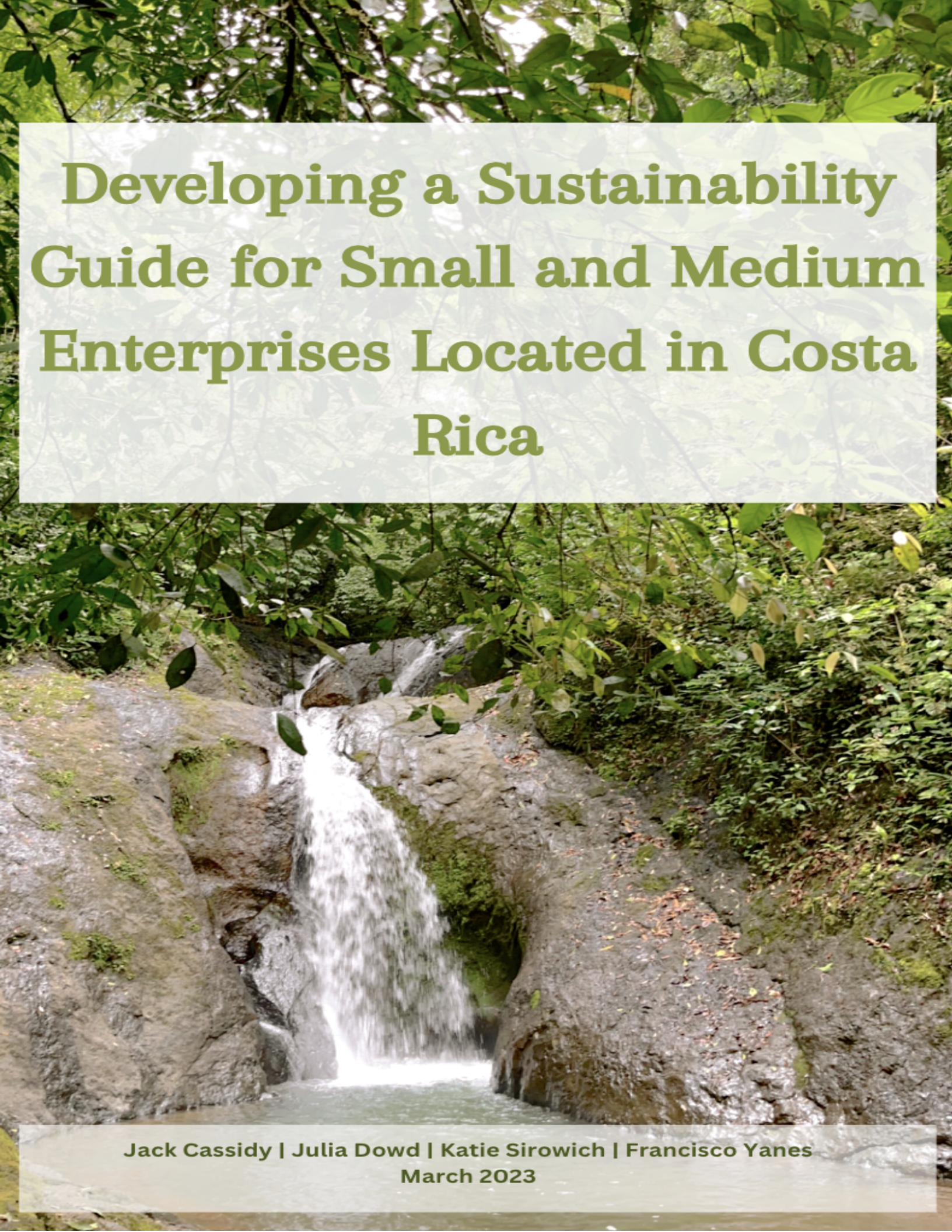
Developing a Sustainability Guide for Small and Medium Enterprises Located in Costa Rica



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Developing a Sustainability Guide for Small and Medium Enterprises Located in Costa Rica

An Interactive Qualifying Project submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science.

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This represents the work of one or more WPI undergraduate students submitted to the faculty as evidence of completion of degree requirement. WPI routinely publishes these reports on the web without editorial or peer review.

Abstract

This project was developed in collaboration with the Costa Rican Chamber of Industries (CICR) to develop a guide for small and medium enterprises (SMEs) to transition to more sustainable business practices. Using data from interviews and survey responses, the team developed a starter guide for SMEs, including the basic first steps toward sustainability. The project team recommends the CICR continue research into SMEs specifically, investigate methods for funding, and invest in education for business sustainability in Costa Rica.

Executive Summary

As climate change continues to worsen, the world must seek to mitigate emissions and reduce negative environmental impact together. Excessive waste production, carbon dioxide emissions into the atmosphere, and human expansion into the natural landscape all contribute to the destruction of ecosystems worldwide. Thus, countries around the world are developing comprehensive plans of action to combat the changing climate, which should lay the groundwork for a global transition to sustainable practices. The private sector must reflect this sustainable transition to protect the earth. Businesses, for example, exist to provide for consumers while maximizing profit, so sustainability can often be difficult to include in their business model. Including environmentally-friendly practices is challenging for smaller businesses with fewer resources. Our project focused on aiding small and medium enterprises (SMEs) in becoming more sustainable while remaining competitive, specifically in Costa Rica.

Costa Rica is a very progressive country in terms of environmental protection, which arises from the desire to protect its impressive biodiversity while promoting eco-tourism. Additionally, Costa Rican geography provides ample opportunity for renewable energy sources such as geothermal, hydroelectric, and wind energy; in fact, 98% of Costa Rica's energy supply is generated by renewable sources (Canney, 2018). Overall, there is a strong Costa Rican culture of sustainability, which must be reflected in SMEs. The Costa Rican Chamber of Industries (CICR) is a private association for industries in Costa Rica. It has a sustainability department that works to aid its member companies as they adopt more sustainable practices. Our team worked in conjunction with the CICR to develop a guide for SMEs to transition to a sustainable business model using the following objectives:

Objective 1: Meet with the CICR to gain an understanding of the company and the company's affiliates involved in the project.

Objective 2: Understand Costa Rican SMEs and what business practices are conducive or counterproductive to sustainability.

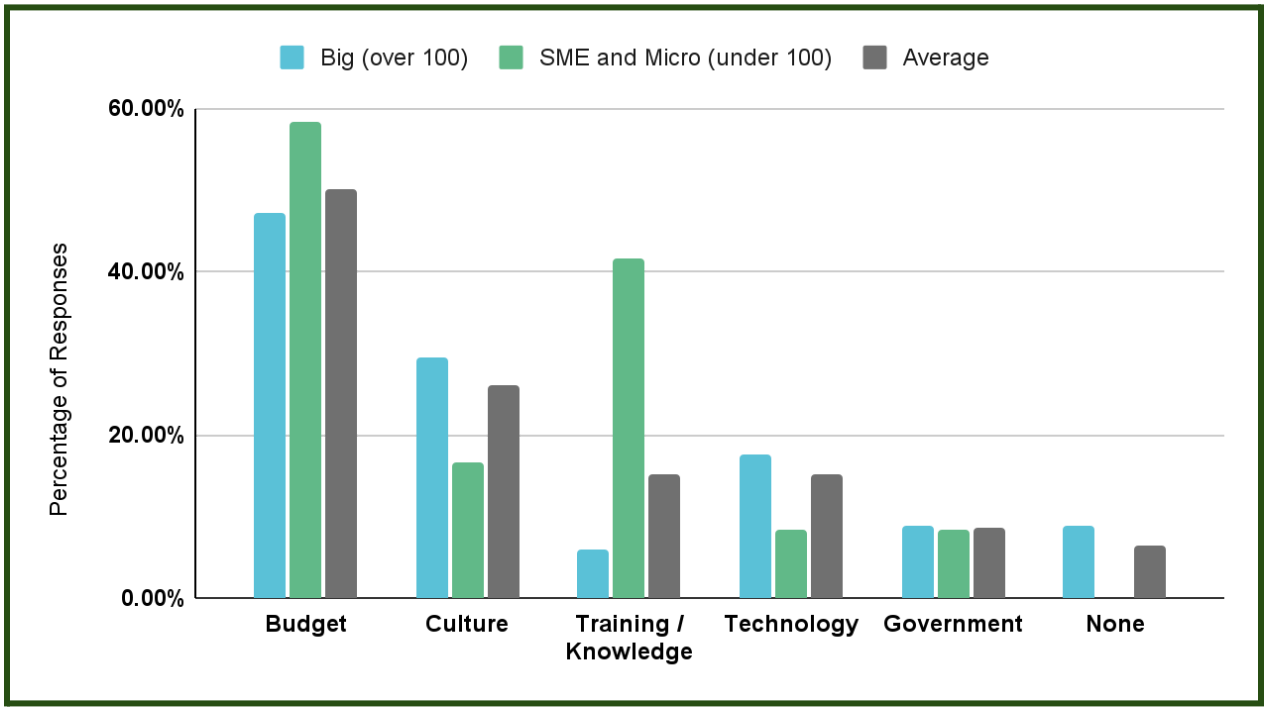
Objective 3: Determine the most efficient and cost-effective methods for SMEs to transition to sustainable business practices.

Objective 4: Develop a written guide detailing the process of switching to sustainable practices for SMEs.

We met these objectives through preliminary research, surveys, and interviews; the data we collected on-site in Costa Rica provided a baseline for our guide, where we could determine faults and successes in sustainability across different businesses.

Across three weeks, the CICR sent out a survey developed by the team to over 700 of their member companies, which garnered 50 total responses. The survey (see Appendix A.3) included questions such as "What are some obstacles your company has in achieving sustainability?", "Does your company have a sustainability department?" and "What percent of your budget is devoted to sustainability areas?" Through this survey, the team identified key findings regarding SMEs in Costa Rica. Regarding obstacles, 58.3% of SMEs mentioned budget and other financial factors as their largest barrier to becoming more sustainable. Training and education was the second largest issue mentioned by 41.6% of SMEs.

Figure 0-1:
Comparison between Large Companies (over 100 employees) vs SMEs and Micro-businesses (1-99 employees) in challenges when implementing sustainable practices.



Note: These answers are pulled from responses to question nine in our survey: "What are the main obstacles your organization has when implementing sustainable practices?"

Other areas of the survey also highlighted issues that SMEs had due to their budget constrictions. 61.5% of surveyed SMEs had a sustainability department, while 90.91% of large

businesses had one. In SMEs, many sustainability departments consisted of one person, who was usually a manager that took on a sustainability role within the company. Comparatively, large businesses more often had entire teams dedicated to sustainability. This disparity between large businesses and SMEs is also seen in their budgets. The survey responses demonstrated that 46.2% of SMEs had a budget dedicated to sustainability compared to 81.2% of large businesses.

Budget issues aside, the majority of surveyed companies tracked environmental indicators to measure environmental impact. Only five companies did not track any environmental indicators, four of which were SMEs; unsurprisingly, these four companies did not have a sustainability department nor a budget devoted to sustainability. These survey findings affirm that the lack of a budget and department for sustainability leads to a general lack of awareness throughout the company; with dedicated personnel and funding for sustainability, employees will be adequately trained and educated on the topic. Further, SMEs need more knowledge to be more likely to implement sustainable practices successfully.

Social responsibility is an aspect of sustainability that should be remembered. According to the survey responses, SMEs are less active in social projects within their communities; only 15.4% of SMEs took part in social projects, compared to 91% of large businesses. However, this number could be lower due to the survey respondents' interpretation of a “social project” or lack of awareness of previous projects. Healthy working conditions exemplify a company’s social responsibility but may not have been considered in this way by respondents. From the responses, SMEs have room for improvement in social projects in their communities.

While waiting for survey responses, we conducted 13 interviews with various Costa Rican companies, ten large enterprises, and three SMEs. The goal of these interviews was to get more open-ended responses than the survey could allow for. This helped us understand different companies' perceptions of sustainability and the methods they used to achieve a more environmentally friendly business model. The interview included questions such as “What steps has your company taken to become more sustainable?”, “What strategies does your company use to reduce energy usage?” and “What manufacturing processes are the most resource-intensive?” We compiled the responses from each company into a “Company Profile" which included many sustainable practices utilized by different companies that we eventually used in our guide. The following table was also included in our company profile for each interviewee:

Table 0-1:

Example company profile table used to develop numerical results from the interviews.

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☑	☐	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

Note: Company profile tables were completed for each interviewee (see Appendix C: Company Profile Template), along with a more detailed description of the company's responses.

Table 0-1 was used to provide quantitative data from the interview, an otherwise qualitative data collection method. While the open-ended interview questions lent themselves well to ideas for the guide, the **Table 0-2** helped us numerically understand the exact measures the interviewed companies had in common. For example, 100% of the interviewed companies tracked environmental indicators, a vital first step to becoming more sustainable that we included in our guide. In contrast, only 46.15% of the interviewed companies were currently carbon neutral or carbon neutral plus.

Table 0-2:

Numerical Data Collected from 13 Company Profiles

Company	A	B	C	D	E	F	G	H	I	J	K	L	M	Total	%
Track Environmental Indicators	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Measure Carbon Emissions	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Currently Carbon Neutral	0	0	1	0	0	0	1	1	1	0	1	1	0	6	46.15%
Use Renewable Fuels or Biofuels in Processes	1	1	0	0	1	0	1	0	0	0	0	1	0	5	38.46%
Have Environmental Management System	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Have Certified Environmental Management System	1	1	1	1	1	1	1	1	1	1	0	1	1	12	92.31%
Involved in Social or Environmental Community Project	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Total	6	6	6	5	6	5	7	6	6	5	5	7	5		

yes	=	1
no	=	0

Note: This data was collected from each of the 13 companies we interviewed. The data was then compiled into an Excel file based on the responses to visualize better the data collected.

The key findings from our research, surveys, and interviews were utilized in the development of our final sustainability guide. This was entitled "A Basic Guide of Sustainable Practices for Small and Medium Enterprises," and was meant to be a beginner guide for SMEs transitioning to sustainable business practices. The most effective solutions can often be costly, while the most inexpensive solutions can often be less effective. Thus, we needed to find a medium of cost-efficient, effective solutions to tailor our guide to SMEs. With this in mind, we divided our guide into seven sections:

1. Logistics & Operations
2. Environmental Indicators
3. Electricity
4. Water
5. Waste
6. Social Impact
7. Environmental Impact

Each of these sections detailed different low-cost methods for businesses to develop more sustainable practices. For example, the electricity section suggested using solar panels, solar water heaters, and natural skylight diffusers to reduce the cost of electricity. The guide can be found in the Findings & Analysis chapter of the paper and on the CICR's website (see Appendix E: Spanish Translation of the Guide). Additionally, there is a supplemental slide deck that acts as a brief overview of the written guide (see Appendix F: Powerpoint Configuration of the Guide).

After extensive research and data collection through surveys and interviews, we developed a guide and a list of recommendations for the future of sustainability in SMEs. Our research only encapsulated a fraction of the many SMEs that exist in Costa Rica, so more investigation is required for the future of these enterprises; however, there are still significant conclusions that can be drawn from our research that is not shared in the guide, with the main findings being the following:

- All enterprises, regardless of size, struggle with funding sustainability.
- Sustainability is challenging for SMEs due to a lack of training and knowledge on the subject.

- Many companies struggle to develop a culture that encourages sustainability.

To address the financial barriers to sustainability, we recommend that the CICR investigate potential avenues for both funding and financially rewarding sustainability. The CICR should request governmental aid for enterprises to motivate transitions to environmentally friendly practices and support legislative changes that would benefit businesses in this transition. To combat the lack of education, the CICR should investigate different methods of training employees on sustainable practices. This could be through businesses sending their employees to a sustainability training program or hiring third-party educators to teach employees how to become more sustainable. This education would also improve the company culture around sustainability by getting individuals invested in their company's impact on the environment around them.

The sustainability guide our team developed is only a start. Our research should be used as a baseline for future projects to examine sustainability within SMEs on a deeper level while investigating more avenues for businesses to mitigate environmental impact. These projects can then further develop the guide through additional research, surveys, and interviews. As work with the CICR continues, future project work can lead to new and more specific iterations of sustainability guides. Perhaps our guide can be a starting point for a detailed sustainability manual for SMEs. As more research is done, the CICR can help develop resources to transition their members into sustainable enterprises effectively.

Authorship Table

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2.2 Sustainability in a Business Setting	Jack Cassidy
2.3 The Sustainable Business Market	Jack Cassidy
2.4 Costa Rican Culture and Climate Action	Katie Sirowich, Julia Dowd
2.5 Policy for Protection of the Environment in Costa Rica	Katie Sirowich, Julia Dowd
2.6 Defining and Understanding Environmental Indicators	Katie Sirowich
2.7 The Mission of CICR and its Connection to Sustainability	Francisco Yanes
2.8 Developing a Guide for SMEs to Transition to a More Sustainable Business Model	Francisco Yanes
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Guide Formatting & Design	Julia Dowd

Acknowledgments

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Our Team

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My name is Julia Dowd; I am from Chapin, South Carolina. I am a student in the class of 2024 pursuing a major in Chemical Engineering with a minor in Business Management. At WPI, I am a member of the women's club basketball team. I am also an active member of Alpha Xi Delta as the electronic communications director.

Our Team

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My name is Katie Sirowich and I am from Beacon Falls, Connecticut. I am pursuing a degree in Electrical & Computer Engineering with a minor in Computer Science at WPI in the class of 2024. I am the president of Alpha Psi Omega, a theater honors society and alumni network. Additionally, I am a member of the Empty Set: Experimental Comedy and love performing with my friends.

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Chapter 1: Introduction

Climate change and the effects of human expansion on the environment are pressing issues the entire world is facing together. Although a natural phenomenon, climate change has accelerated in the past century at a rate that natural evolution will not match due to the rapid increase of carbon dioxide emissions from widespread industrialization. This acceleration has driven the depletion of the ozone layer, breaking down a natural shield from the sun's rays and increasing the global average temperature to dangerous levels (Lindsey & Dahlman, 2022). This climate crisis has no one solution but must be combated with a global transition to sustainable practices.

Costa Rica is one of the leading countries in this global push for sustainability. Costa Ricans take pride in their conservation efforts as a country where changes have come from the government and consumer levels. For example, Costa Rica implemented the most successful reforestation programs in the world. In 1987, less than 37.5% of the nation was covered by rainforests, a vast difference from the 75% coverage measured in the 1940s. After reforestation legislation in the 1990s, Costa Rica has returned to nearly 60% forest coverage (Lewis, 2020). The successful reforestation efforts by Costa Ricans exemplify their passion for the environmental safety and restoration of their country, which the practice changes in the private sector can also reflect.

Many businesses have put in the effort to become more environmentally friendly and keep up with the increasingly sustainable culture in which they operate. However, switching to sustainable practices as a business is often a complex process that is different for every company. To simplify this process, the Costa Rican Chamber of Industries (CICR) wanted to create guidelines to work with businesses to promote environmentally friendly business practices. The CICR is a business organization that supports over 700 member businesses; one of their responsibilities is to encourage sustainability efforts within Costa Rica's production sector. The goal of this project was to help the CICR develop a guide for small and medium enterprises (SMEs) to transition to and maintain a more sustainable business model.

The goal of our guide was to aid SMEs through the process of implementing more environmentally friendly practices that comply with Costa Rican standards while remaining cost efficient and easy to implement . SMEs often lack the funding and resources that larger enterprises can utilize to become more sustainable, which meant we had to tailor our guide specifically to these smaller enterprises. Our guide refers to low cost methods and simple steps for these businesses to undergo a transitional period to become more sustainable. We followed the following objectives to develop our guide:

Objective 1: Meet with the CICR to gain an understanding of the company and the company's affiliates involved in the project.
Objective 2: Understand Costa Rican SMEs and what business practices are conducive or counterproductive to sustainability.
Objective 3: Determine the most efficient and cost effective methods for SMEs to transition to sustainable business practices.
Objective 4: Develop a written guide detailing the process of switching to sustainable practices for SMEs.

We accomplished these objectives through preliminary research, surveys, interviews, and tours of company facilities; These data collection methods provided valuable insight into widely-faced challenges to sustainable development, as well as current practices followed by larger companies that were achievable for SMEs. Many of our survey responses and interview questions were answered by larger, already very sustainable companies. Thus, we examined the steps they first took toward sustainability to determine where SMEs should begin their transitions. We also explored the simple, inexpensive solutions these businesses implemented to lower energy consumption and carbon emissions that we could recommend to SMEs. Our investigation of these businesses allowed us to pinpoint effective and ineffective methods for sustainable transitions, and develop our guide to address universal challenges faced by different companies. Our final guide detailed the most affordable, effective, and overall sustainable changes that small and medium enterprises could undertake.

In this paper, we detail our preliminary background research and literature review, followed by the methodology we observed to collect our data. Next, we analyzed our findings

and used that data to develop and translate the guide. Finally, we discuss the conclusions we drew from this project, along with recommendations for the future of sustainability for SMEs.

Chapter 2: Background & Literature Review

This chapter first explains the United Nations' sustainable development goals. Next, we examine how these goals can be applied to a business environment and the competitive advantages of a sustainable business model. We then move on to a broad overview of Costa Rican culture and geography in sustainable development, detailing environmental indicators to track ecological impact. To understand the project further, we provide a background on the CICR and investigate previous projects they have sponsored. Finally, we apply our knowledge of Costa Rican climate response and CICR projects to develop a guide for SME transitions to sustainability.

2.1 The United Nations Sustainable Development Goals

In 2016 the United Nations adopted the 2030 Agenda for Sustainable Development, which consisted of seventeen Sustainable Development Goals (SDGs). Crafted at the 2015 UN Summit, these goals were intended to mobilize efforts to end all forms of poverty, fight social inequality, and mitigate climate change in the coming years (United Nations, 2022). The SDGs outline new markets and opportunities for businesses while specifying sustainability progress the world should achieve by 2030. To succeed, public administrations and private businesses must adopt these global goals. If government entities and private companies do not assume responsibility for carbon emissions by adopting the United Nations SDGs, sustainability progress will be significantly hindered.

The 2022 Sustainable Development Goals Report highlighted the recent challenges to progress imposed by the COVID-19 pandemic, which caused the 2030 Agenda to become unrealistic in the given timeframe. COVID-19 has reversed progress in poverty, health, and basic services (United Nations, 2022). The world is also enduring the highest number of conflicts since the creation of the United Nations. Approximately 2 billion people live in conflict-affected countries, and the number of refugees is at its highest on record. These conflicts create a worldwide struggle and are more significant than just the countries involved. The Ukraine and Russia conflict has caused prices to skyrocket and has disrupted the global supply chain. This singular war could cut economic growth by 0.9%. (United Nations, 2022) These issues will only

deteriorate with climate change, which multiplies the impact felt across the globe (United Nations, 2022). The UN outlined three areas to focus on to get back on track. First, we must embark on peace and end armed conflict. The world cannot move on with the senseless loss of life, and the resources wars use up. Second, we must adapt to new ways to reduce carbon emissions, conserve resources, transform food systems, create better jobs, and transition to a greener economy. Improving public services and investing in clean energy will address the root causes of inequality and climate change. These effects are compounded when they are linked together and multiply the results felt around the globe. Lastly, transforming the debt structure will ensure equity among different income classes. Developing countries are often left behind, but we must unite to ensure no one is abandoned. Countries must strive to follow the SDGs to achieve national and global sustainability.

Our collaboration with CICR guided us towards looking into SDGs 9, 11,12, and 17, as they would contain the most relevant information regarding creating a sustainability guide. These goals are more business and economically-oriented, which is what our guide will be focused on.

Goal 9 states explicitly its mission is to "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation." Following the global COVID-19 pandemic, almost one in three jobs was negatively impacted, and low-technology industries have yet to recover. Manufacturing in the least developed countries felt harsh conditions due to volatile global demand and disruption to global trade. This helped prove the importance of fostering innovation in less developed countries. It is a target of Goal 9 to upgrade infrastructure and retrofit industries to make them sustainable. Small enterprises are also more vulnerable to economic downturns due to their lack of available financial resources and supply chain dependencies. A way to minimize this effect is by increasing the access of small-scale industrial enterprises to financial services, including affordable credit and integration into markets. Overall, the goal is to support the development of sustainable, inclusive infrastructure and industries that can support economic growth and development. However, this must be done in a sustainable way that does not harm the environment or contribute to climate change.

Goal 12 aims to ensure sustainable patterns of consumption and production, this can be done by reducing waste and the overuse of natural resources. Social and economic progress over the past years has been accompanied by environmental degradation, so it is important to promote

new sustainable technologies that grow production without inhibiting sustainability. In 2021, 83 policies were implemented to support the shift to sustainable consumption and production, which brings the total number of policies up to 438. The distribution of policies, however, is uneven, where 79% of policies come from high-income and upper-middle-income countries, and only 8.2% come from low-income and least-developed countries. Even with the new guidelines, the global material footprint has begun to grow, but the pace has slowed, indicating a slowdown of economic pressure on the environment. By December 2020, forty countries reported sustainable public procurement policies and planned to boost the acquisition of environmentally friendly and energy-efficient products to promote responsible purchasing and sustainable supply chains. A big area of overproducing happens with food; about a third of the total food produced goes to waste. This food is lost during harvest, transportation, and storage, but it mostly happens inside the home, where about 17% or 931 million tons of food is lost. This overproduction stresses natural resources such as water and fuel for cultivating crops. Excessive use of water highlights the global water supply, and currently, over two billion people live in countries experiencing high water stress. Goal 12 emphasizes the importance of monitoring the usage of resources during production and breakdown, where businesses could conserve and be more sustainable. The goal targets strengthening scientific and technological capacity to become more sustainable, developing tools to monitor waste, and implementing laws to phase out harmful practices to decrease the environmental impact.

Goal 13 advises us to take urgent action to combat climate change and its impacts. As time passes, our window to avoid climate catastrophe is closing rapidly. As global temperatures increase, there is cause for concern as we will see more extreme weather patterns and an increased risk of natural disasters. Global emissions are set to increase by almost 14% in the current decade, which could lead to a climate catastrophe. To combat this, 123 counties have adopted natural disaster risk reduction strategies to limit global warming. It is recommended that global emissions should be cut by 4%, so the global temperature only increases by 1.5 degrees Celsius within the coming years. The United Nations suggests improving education and raising awareness on climate change mitigation to fight the looming consequence of climate inaction. It also calls for $100 billion annually to address the needs of developing countries so they can implement and operate on new climate objectives. These objectives include raising the capacity

for climate-change-related planning and management. If little to no advances are made, looking at an unfamiliar world in the decades to come is possible.

Goal 17 states we must strengthen the means of implementation and revitalize the Global Partnership for the goals. Developing countries are finding it hard to recover from the pandemic. We need international cooperation to create lasting solutions. At least developed countries need resources to get back on track, and we all must come together to support the 17 United Nations Sustainability Goals.

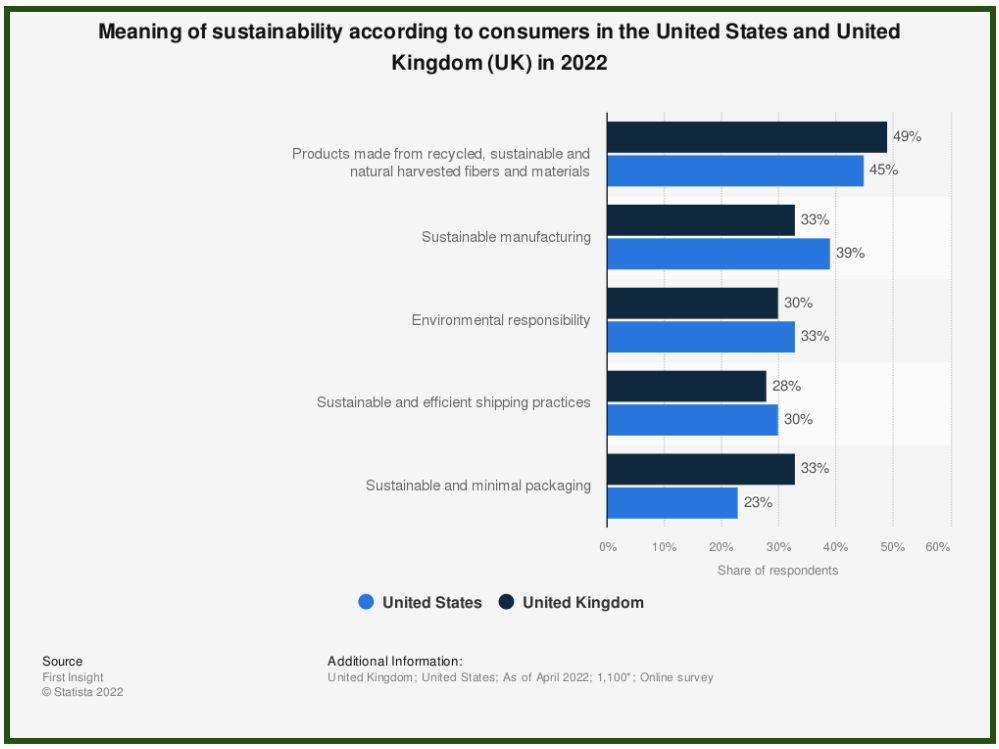
2.2 Sustainability in a Business Setting

Sustainability has different definitions within different contexts. In a business setting, sustainability means functioning without negatively impacting the environment and community while considering future and present effects. A sustainable business focuses on meeting the triple bottom line, which considers profits, people, and the environment (Maryvile, 2019). While sustainability practices tend to hinder short-term profits when first implemented, they can contribute to business success by being socially responsible and reducing resource usage. Companies with high environmental, social, and governance metrics have a lower cost of debt and equity (Spiliakos, 2018). In addition, good company initiatives drive public support, creating a better bond with the community. A sustainable business operation considers the business's effects on the environment and society to positively impact at least one of those areas (Spiliakos, 2018). Sustainable businesses consider a wide range of environmental, economic, and social factors that are involved with their operations. With this in mind, businesses can achieve sustainability by using sustainable materials in manufacturing processes, optimizing supply chains to reduce emissions, using renewable energy sources to power infrastructure, and even sponsoring education funds for the local community.

As sustainable business models adapt and change due to new research, companies look to be at the forefront of new ideas while advertising their efforts to consumers. Companies understand the importance of marketing their brand and actions to consumers who prefer to support sustainable business practices. A recent survey in the UK sustainability report ranked the meaning of sustainability according to consumers.

Figure 2-1

Meaning of sustainability according to consumers in the United States and United Kingdom (UK) in 2022.



Note : First Insight. (April 1, 2022). Meaning of sustainability according to consumers in the United States and United Kingdom (UK) in 2022 [Graph]. In *Statista*. Retrieved January 25, 2023, from (https://www-statista-com.ezpv7-web-p-u01.wpi.edu/statistics/1318301/meaning-of-sustainability-according-to-us-and-uk-consumers/)

Of the available options, respondents in both countries were most interested in sustainable manufacturing and reducing resource usage by creating recycled and sustainable materials products. Of course, looking at two global markets does not directly correlate to Latin American economies. However, Costa Rica has recently taken in a sizable amount of foreign investment and offers services to multiple other markets, with its primary market being the US (World Integrated Trade Solution, 2020).

There are many methods used to encourage and achieve sustainable business practices. However, some basic steps include assessing the problem, defining objectives, establishing a clear mission, creating and executing a strategy, and analyzing the results.

Planning the resource acquisition and usage logistics is essential when assessing the problem and defining objectives. It is also crucial to analyze the manufacturing and business processes to understand what areas and techniques are wasteful, what materials are less sustainable, and what working conditions. Being sustainable is more than regulating resource usage and emissions.

Creating a mission is important in publicizing the societal impact a business wants to achieve. The mission supports the company's values and purpose regarding sustainability, serving as a guide in reaching new objectives and a reminder of the company's purpose in society. Mission statements should define the five Ws: who, what, when, where, and why, and consider both the environmental impacts of your business and also the social side that is often overlooked (Spiliakos, 2018). It is critically important to encourage employee commitment to business sustainability efforts, as each position in the business has opportunities to bring new ideas to the table. For example, managers and supervisors can provide valuable support in improving sustainability due to their hands-on leadership role and employee experience. Business owners and leaders tend to be the most important as they have the intellectual acumen to identify successful strategies and the power to implement them. Lastly, employees can take the hands-on approach; they are the most connected with the product and business procedures. According to the Stanford Social Innovation Review, Unilever factory employees at an English tea plant saved the company 47,500 euros. They eliminated 9.3 tons of waste by changing the size of paper tea bags (Maryville, 2019). These employees see wasteful everyday procedures and can provide valuable insight that others do not experience. Each position must buy into the sustainability mission and strategy to succeed; otherwise, a significant shift in the business culture is impossible.

The most complicated step is crafting a successful strategy for the mission statement. An essential piece of the strategy is ensuring the company remains profitable while becoming more sustainable. This may result in having to raise prices for goods and services. A study by Capterra found that 32% of consumers strongly agree that sustainable products are reasonably priced. This figure has doubled from the initial finding of 16% received in 2021. The willingness to pay more has increased by about 8% since 2021, even with rising inflation. (Montgomery, 2022) Another study by Unilever found that 33% of customers want to buy from brands "doing social or environmental good" (Spiliakos, 2018). The evidence is apparent that consumers will spend

more on sustainable products. It's up to the business to advertise and relay its sustainability efforts to attain success.

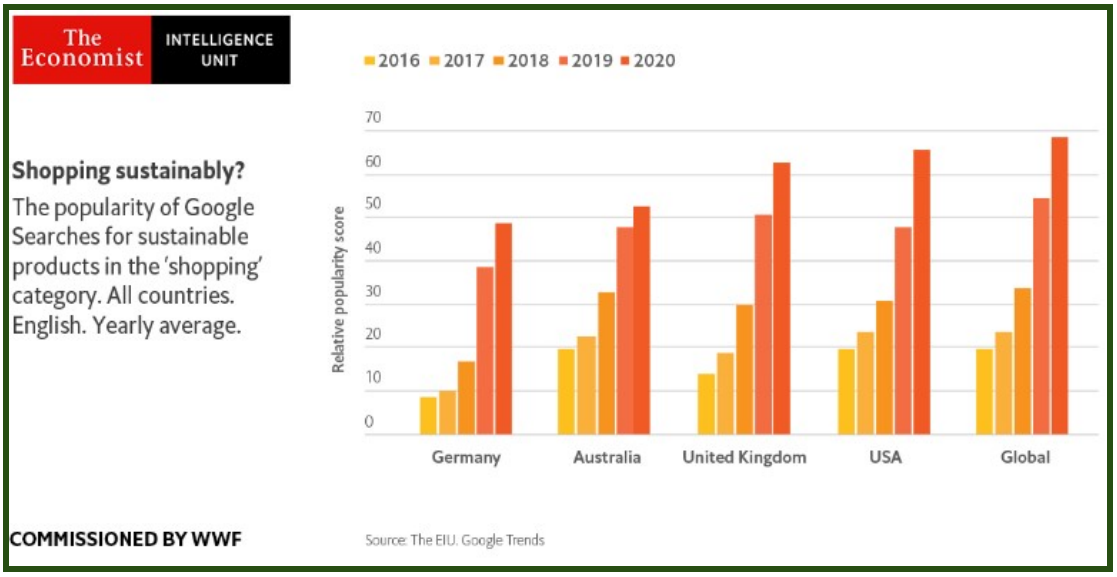
Sustainable development strategies and mission statements will need revisions as the business grows. Thus, it is critical to revisit the process to make sure the objectives, mission, and strategy align with sustainability goals such as the SDGs.

2.3 The Sustainable Business Market

The initial start-up cost of becoming sustainable can be daunting to some companies, especially those with low cash reserves. Small businesses, for example, have limited resources available to shift to 'green' business practices. While "Greening" a business takes an initial investment, the switch can eventually turn a profit. Sometimes, it reduces business costs by improving operational efficiency and cutting resource usage. For example, for ten years, clients of the service provider Elytus saved over $11 million through sustainable waste management (Maryville, 2019). Other companies also have proven successful in sustainable practices; S&P 500 companies with sustainable practices implemented into their strategies performed better than those without and posted an 18% higher ROI (return on investment). In addition, a sustainable business plan improves a company's reputation, conveying to consumers that businesses care about turning a profit and protecting the environment. In a survey recently commissioned by the World Wildlife Fund, the popularity of Google Searches for sustainable products has increased yearly and continues to skyrocket globally.

Figure 2-2

The popularity of Google Searches for sustainable products.

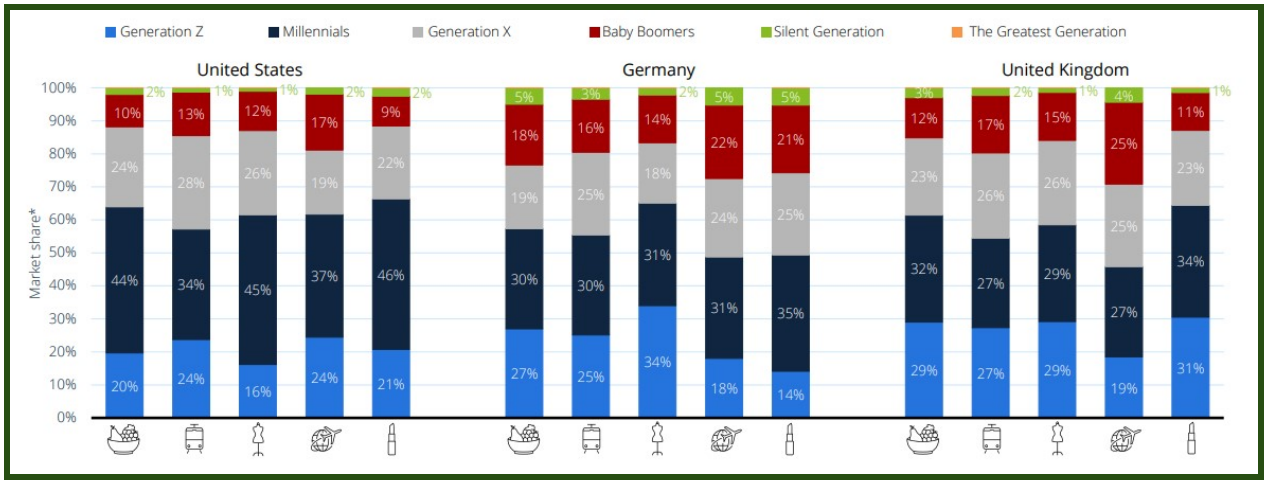


Note: The Economist Intelligence Unit. (2020) Shopping sustainably? The popularity of Google Searches for sustainable products in the 'shopping' category. All countries. English. Yearly Average [Graph]. Commissioned by the World Wildlife Fund. Retrieved January 25, 2023, from (https://www.greenbiz.com/article/theres-growing-demand-greener-goods-its-not-easy-sell)

The trend and popularity of buying sustainable products will only increase as younger generations begin to consume more. Age has significantly divided attitudes toward sustainability and climate change issues. A study by Capterra found that a more significant percentage of Gen X and Baby Boomers disagreed with the raised price of sustainable goods compared to the percentage of Gen Z and Millennials (Montgomery, 2022). However, this is one area where age plays a part; in that same study, older Americans were less likely to check if a product was sustainable before purchase. Nearly 19% of Baby Boomers studied say they rarely check or never check if products are sustainable, compared to only 1% of Gen Z (Montgomery, 2022). The sustainable market has the interest of younger generations, and there is substantial evidence of this by looking at the market share held by each generation. Many millennials have gotten into the labor market and have piqued their interest in sustainability; they currently control the largest share of each sustainable market. Generation Z is currently buying fewer sustainable products or just products in general, but their share in sustainable markets is expected to increase as they enter the workforce.

Figure 2-3

Predicted Sustainable Market Share for each Generation by 2025.



Note: From "Gen Z and Millennials - The generational gap in sustainable consumption", by C. Saggau, and M. Connell, 2021, p.37 (https://www-statista-com.ezpv7-web-p-u01.wpi.edu/study/102352/gen-z-and-millennials-the-generational-gap-in-sustainable-consumption/).

As the younger generations expand their purchasing power, they will increase the size of the sustainable market, leaving companies a void to fill. Precedence Research predicts 2030 that the sustainable market will grow to $417.35 billion and increase at a compounding rate of 21.6% yearly from 2020-2030 (Precedence, 2022). In addition, professionals are beginning to understand the importance of the changing business culture, and 75% of corporate sustainability professionals say businesses need to get better at including sustainability in business strategy to address global mega-trends (Maryville, 2019).

In all three markets that Statista Dossier Plus evaluated, they projected that the two youngest generations will hold most of the sustainable market share by 2025. This trend will only increase as the younger generations try to do more to protect the planet and adopt sustainable ways of living. Businesses have an excellent opportunity to get ahead of this sustainable trend that will only grow over time. Just as it is important to analyze sustainability benefits to business profit and consumption itself, it is also important to analyze the effects of sustainable business on the environment in which it exists.

2.4 Costa Rican Culture and Climate Action

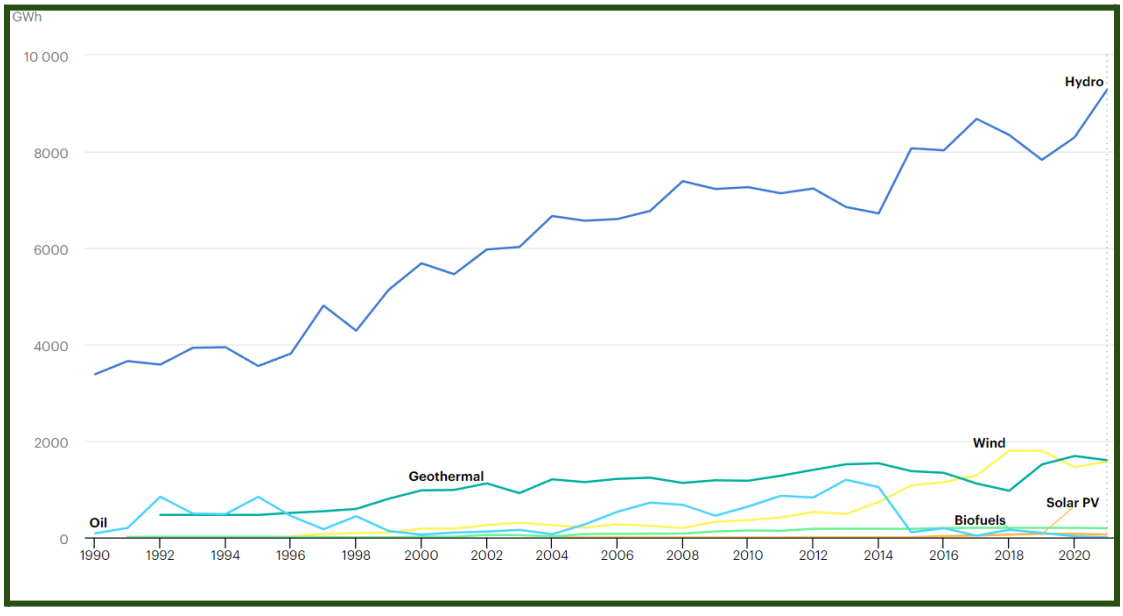
Before focusing on businesses in Costa Rica, the culture, climate, and location in which businesses function must be analyzed to gain cultural context. In response to a bloody Civil War

in 1948, Costa Rica abolished their military, effectively reducing tensions and saving money (Anderson, 1998). The symbolism of demilitarization established a common ground for many Costa Ricans, contributing to the strong sense of national pride that is seen today. In addition, demilitarization's monetary benefit allowed for more significant sustainability program funding and reforestation incentives. For example, the government implemented the Payment for Ecosystem Service Programme, a 1997 addition to the Forestry Law of 1996, which paid private forest owners to conserve their forest land (Canney, 2018). Within this legislation, landowners could be paid for reducing carbon emissions and protecting water sources, biodiversity, and "scenic beauty." In recent history, this is just one instance of Costa Rican policy protecting their environment, which indicates the community's devotion to sustainable living and conservation efforts.

Geographically, Costa Rica is a perfect candidate for sustainable living. With many rivers running throughout the country, Costa Rica has impressive hydroelectric power systems and geothermal energy generation made possible by mountainous regions. Hydroelectricity has been Costa Rica's largest energy source since 1990, producing 8.677 Gigawatt hours [GWh] in 2017, compared to the next highest source of energy that year, wind power at 1288 GWh (*Costa Rica Electricity Generation by Source*, 2022).

Figure 2-4

The International Energy Agency's measure of Costa Rican electricity generation by source from 1990 to 2021.



Note: The International Energy Agency's measure of Costa Rican electricity generation by source from 1990 to 2021. Source: IEA (2023) World Energy Balances 2022. All rights reserved.

As evidenced by the above, the geographical makeup of Costa Rica lends itself to clean energy production. Furthermore, renewable energy sources generated 98% of the Costa Rican energy supply as of 2018 (Canney, 2018). Costa Rica is thus uniquely suitable for a transition to entirely sustainable living. This does not mean, however, that there is nothing to be done to conserve energy in Costa Rica. Globally, energy storage is an ongoing challenge, where specific storage methods can only sometimes keep up with the energy being produced. Thus, Costa Rica is not immune to energy loss like the rest of the world.

2.5 Policy for Protection of the Environment in Costa Rica

Environmental protection is a passion for Costa Ricans and a constitutional right. Article 50 of the Constitution of Costa Rica states that all Costa Ricans have "the right to a healthy and ecologically balanced environment," a right which the Costa Rican government "will defend and will preserve." Thus, conservation is rooted in state legislation, and Costa Rican administrations and policies reflect that. For example, The Ministry of Environment and Energy (MINAE) is responsible for environmental protection. In 2007, MINAE declared an ambitious goal for carbon neutrality by 2021 (Canney, 2018). The progressive 2021 goal forged a path for rapid legislation and preventative measures even before the 2016 Paris Agreement, putting Costa Rica at an early lead for climate action.. Although not achieved in 2021, Costa Rica is well on its way to projected carbon neutrality by 2050 with significant motivation from the Paris Agreement (Costa Rica Climate Action Tracker, 2021).

The Paris Agreement is an international climate change treaty founded in Paris by 196 individual parties in December 2015, which became effective in November 2016. The agreement focused on a socioeconomic transformation not only for the businesses involved but also for the transformation of signatory countries. To mitigate climate change, the agreement focused on "5-year cycles," during which countries review and ultimately submit a climate change action plan (United Nations Climate Change, 2020). An action plan submitted by a country is known as a Nationally Determined Contribution (NDC), which allows countries to express their concerns and propose their methods to reduce greenhouse gas emissions. Countries will also communicate

their movements toward combating the impact of rising temperatures. Before the target year of 2050, by the year 2030, 70% of global emissions will enter a competitive sector creating zero-carbon solutions.

Costa Rica's carbon neutral pledge has also extended to the private sector, where many businesses have taken steps toward carbon neutrality: the business creates an inventory of its emissions, attempts to reduce emissions, then pays FONAFIFO, the National Forestry Financing Fund, to offset remaining emissions (Flagg, 2018). Although broad, the three steps above outline a basic plan for emission mitigation, which will require more precise and actionable steps in order

to be successful. These steps share a resemblance to the process of sustainable transitions detailed in Section 2.2. Overall, Costa Rican policy has been a progressive catalyst for sustainable transitions, but carbon neutrality can only be achieved if private businesses follow and maintain a sustainable model successfully.

2.6 Defining and Understanding Environmental Indicators

One way a business can measure its sustainable practices is through environmental indicators. Environmental indicators allow businesses to keep track of their impact on the environment with a numerical quantity in different categories. For example, one company may track its water usage. These indicators can range from broader categories, such as water and food, to more specific concepts, such as the total amount of recycled material a company may use. In addition, these indicators will vary from country to country due to the different climates. Therefore, Costa Rica will have a set of indicators that may generally apply to the rest of the world. However, the specifics within each indicator will be unique to Costa Rica.

The Banco Central de Costa Rica (Central Bank of Costa Rica) lists environmental accounts indicating water, forest, and energy resource usage. Since this list comes from the Central Bank of Costa Rica, the indicators exist in an economic context that can eventually influence public policy. This is especially useful for our project, as we will work with businesses to improve sustainability, so economic incentive is essential. The categories of each account were determined by the System of Environmental-Economic Accounting (SEEA) as an international standard in 2012 (*Environmental Accounts*, 2023). The Central Bank of Costa Rica tracks the following five indicators:

- Water Accounts
- Forest Accounts
- Energy Accounts
- Material Flow Accounts
- Environmental Protection Expenditure Account - Private Sector

The above indicators have individual reports that get updated on the Central Bank of Costa Rica website, detailing the specifics of, for example, water usage for the year. Since the bank tracks these accounts, they will likely make up the different segments of our guide. Understanding which indicators different businesses track will provide valuable data for what environmental issues are more difficult for SMEs to combat or track. However, it is essential to remember that these indicators are broad categories. The following paragraph details a study of more specific indicators tracked by North American businesses and can thus provide an idea of the more precise indicators.

Although the above indicators provide a general overview of the Costa Rican environment, businesses will likely affect the environment more specifically within these categories. In a study of Sustainable Business Practices, researchers analyzed North American industries and their public environmental information. Ninety sustainable business indicators (SBIs) were identified by conducting a pilot survey. A general indicator would as an SBI if over 60% of the samples were reported (Bae & Smardon, 2018). Of the 90 SBIs, 22 were environmental and detailed water usage, energy usage, waste generation, and environmental strategies implemented. Some of the indicators are detailed below:

- Total amount of water used
- Total amount of materials used to package product
- Total amount of materials used to produce products
- Total amount of renewable resources used
- Habitats protected or restored

The above indicators are particular to individual businesses but can remain a baseline for understanding what businesses may be tracking when using broader environmental indicators. Therefore we will use the list of environmental accounts created by the Central Bank along with our understanding of possible specific indicators within each account to create a survey

containing environmental indicators and inform interview questions on specific processes that affect the general environmental accounts

2.7 The Mission of CICR and its Connection to Sustainability

The Costa Rican Chamber of Industries (CICR) is one organization that promotes sustainability in Costa Rican businesses. The CICR is a private association for industrial companies located in Costa Rica. Their mission is to promote sustainability in the industrial sector and to offer resources for their associated companies to improve their businesses. The association was founded in 1943 to help industrial businesses; the CICR currently has many programs for businesses and business owners that benefit growth. Some of these programs include the "Programa de Actualización Continua," which translates to the Program of Constant Actualizations; it is a program that offers seminars and more than 400 courses to business owners. Another popular program in CICR is "El Programa de Responsabilidad Social," which translates to the Social Responsibility Program, a seminar focused on the social aspect of a business.

The CICR is divided into nine commissions, each with its own role within the association and offering different resources for different types of businesses. The commissions are the following:

1) Economy and Finances
2) PYME (SME in Spanish)
3) Alternative Energy Production
4) International Commerce and Logistics
5) Human Resources
6) Environment and Social Responsibility
7) Quality
8) Innovation
9) Customer Service

The commission we focused on is the Environment and Social Responsibility Commission. The Environment and Social Responsibility Commission is mainly focused on helping businesses use their resources more sustainably while not compromising their operations

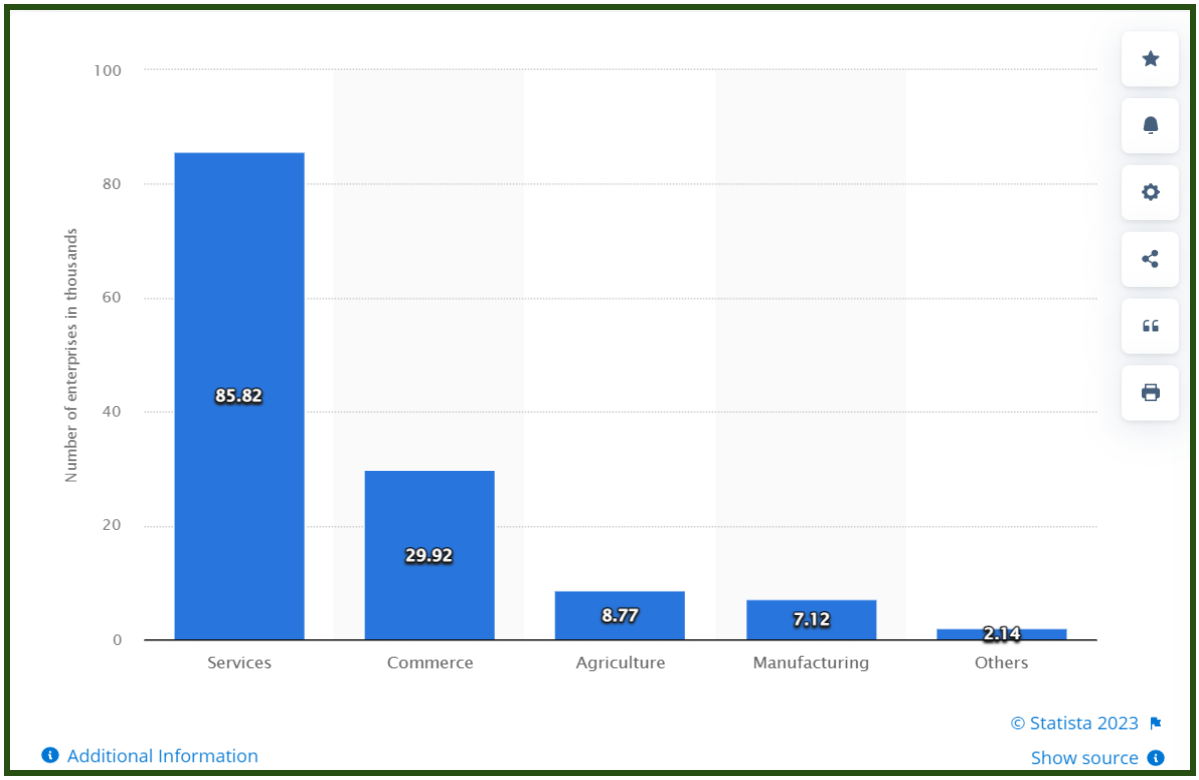
and profits. In this project, we worked with the CICR to develop a guide for smaller businesses to transition to and maintain sustainable business practices.

2.8 Developing a Guide for SMEs to Transition to a More Sustainable Business Model

Small and medium-sized enterprises (SMEs) account for most of the world's economy. However, they also struggle to achieve more sustainable operations. Climate change response has pushed companies to achieve more sustainable practices in recent years. This is much easier for larger companies with more significant funding. However, when people think about sustainability and corporations, they often think about big companies like Google or Apple while unintentionally ignoring SMEs. A local coffee shop, for example, may not come to mind when thinking about businesses becoming more environmentally friendly. The gap in sustainability between large corporations and SMEs can be exemplified by the disclosure of emissions in the S&P 500 and 400. The S&P 500 is an index for the top 500 companies and their trading values, and the S&P 400 is the same type of index but for medium size companies. As of 2022, 70% of the S&P 500 companies disclose their greenhouse gas emission, while only 28% of the S&P 400 companies disclose the same information (Caygill, 2022). Thus, the CICR wants to investigate sustainability options for SMEs to reduce this gap.

Economic sectors can categorize SMEs in Costa Rica: Manufacturing, Commerce, Services, and Agriculture. The Manufacturing sector tends to be one of the largest among the SMEs; however, in Costa Rica, the Economic sector with the most SMEs is the Service sector, likely due to Costa Rica's tourism and ecotourism. The following graph shows the distribution of SMEs by economic sector in Costa Rica.

Figure 2-5:
Number of micro, small, and medium-sized enterprises (SME) in Costa Rica in 2017.



Note: Number of micro, small and medium-sized enterprises (SME) in Costa Rica in 2017, by economic sector *(in 1,000s)*.
(https://www.statista.com/statistics/1022925/costa-rica-micro-small-medium-enterprises-sector/)

In order to provide more resources for SMEs to transition to more sustainable business models, many guides have been created. A great example of these resources is the Sustainable Business Guide, which explains why SMEs struggle to become more sustainable. The guide lists the reasons as the following:

- Lack of awareness among employees about the importance of sustainability
- Lack of awareness of business owners of the benefits of sustainability practices
- No available access to affordable financial resources
- Inadequate and insufficient skills and management-developed practices
- Lack of information on how to implement sustainability
- The interference of intended sustainability initiatives with other business initiatives

The list of reasons above shows how SMEs lack information regarding sustainability, which can be improved by creating guides for sustainability. Therefore, with the Sustainable

Business Guide as a starting point, we will work with the CICR to develop a guide for Costa Rican SMEs to transition to and maintain a sustainable business model.

An example of a sustainability guide that can be used in Costa Rica is the “Manual de buenas prácticas ambientales” which describes changes SMEs can make in different aspects of their business in order to become more sustainable. Some examples of areas of improvement are energy consumption, water waste, waste management, and transportation. The guide also provides the following list of goals for the companies once they have implemented the recommendations:

- Overall reduction of energy consumption
- Overall reduction of water consumption
- Minimization of climate change and greenhouse gas emissions in the atmosphere
- Improvement of the company’s reputation
- Employee commitment to the maintenance of sound environmental practices

The goal of small and medium-sized enterprises in becoming more sustainable is multifaceted. First, implementing sustainable practices can help SMEs reduce their environmental impact and improve their reputation among consumers increasingly concerned about the environmental and social impact of the products and services they purchase. Additionally, implementing sustainable practices can help SMEs save money in the long run by reducing their energy and resource usage and improving their operations' efficiency. Finally, SMEs can benefit from government incentives for implementing sustainable practices, such as tax breaks and subsidies. Overall, the goal of SMEs in becoming more sustainable is to improve their economic performance while reducing their environmental and social impact.

Chapter 3: Methods

3.1 Overview of Objectives for Methods Chapter

This project aimed to develop a guide for small and medium enterprises in Costa Rica to use in transitions to and maintenance of sustainable business practices. We achieved this goal by completing the following objectives:

Objective 1: Meet with the CICR to gain an understanding of the company and the company's affiliates involved in the project.

Objective 2: Understand Costa Rican SMEs and what business practices are conducive or counterproductive to sustainability.

Objective 3: Determine the most efficient and cost-effective methods for SMEs to transition to sustainable business practices.

Objective 4: Develop a written guide detailing switching to sustainable practices for SMEs.

3.2 Objective 1: Meet with the CICR to gain an understanding of the company and the company's affiliates involved in the project.

In order to create a successful sustainability guide for SMEs in Costa Rica, we needed to understand the demographic we were working with and the social and cultural context of our project within Costa Rica. Our first objective was to meet with the CICR in order to learn more about the companies that will use our guide in the future. During the meeting, we discussed the expectations for the project with our sponsors. The data gathered from the survey was meant to be used as a diagnosis of the industrial sector in Costa Rica. In addition, we discussed the expectations the CICR had for the sustainability guide; the guide's format changed to a multi-platform guide with a written report and a visual representation of the project's results. It was necessary to initially meet with the CICR to contextualize and understand our project expectations and how we would form a guide for SMEs. After the meeting, we got a better understanding of the project's context and its impact on the economic sector of SMEs in Costa Rica. The goals for the guide also changed after the first meeting; at first, the goal was to help SMEs become more sustainable. However, our sponsor added that the guide would help with

sustainability and help SMEs be more competitive in international markets, such as the US and the European markets.

3.3 Objective 2: Understand Costa Rican SMEs and what business practices are conducive or counterproductive to sustainability.

We wanted to collect new data instead of relying completely on previous research that may now be outdated. Thus, we developed surveys and interviews to collect data that we will analyze for our guide. When conducting the surveys and interviews, the subjects were informed that they were not required to answer any question and that the data would remain anonymous unless they specified otherwise. The data we collected from the surveys and interviews were used to inform our guide. Acknowledging where SMEs were lacking or excelling in achieving sustainability provided a baseline for the current implementation of sustainability practices. With this data, we began to create our own guide and developed ideas for effective, sustainable practices using quantitative data. Throughout our meetings with our sponsors, both the survey and the interview underwent many changes for clarity of questions as well as the functionality of data for developing our guide.

3.3.1 Developing the Survey

The CICR provided us with means to send a Google Forms survey out to all CICR members, over 700 companies, which was sent multiple times in the weekly newsletter to encourage recipients to fill it out. The credibility of the CICR also provided an incentive for business owners to complete the survey. However, it was still necessary to design the survey as short and to the point as possible to motivate businesses further to complete the survey, as many SME owners are very busy. Additionally, the questions on the survey had to be as clear as possible in order to provide acceptable data for analysis. Thus, the survey was composed of a section of multiple choice and numerical questions, along with a section of short answer responses. The data from the short answer portion is qualitative. Still, the numerical answers provided quantitative data that helped us to detect trends across different SMEs that correlated with how sustainable each company was. The short answer responses contained important context about the sustainability goals of different SMEs, while the numerical responses provided

a basis for statistical analysis. In the survey, the quantitative answer questions were regarding the following topics:

- Age of company (year founded)
- Size of company (number of employees)
- Industry of company (multiple choice)
- Budget set aside for sustainable practices (percentage or monetary value)
- Tracking of environmental indicators (yes or no answer)

It was important to question the size of the company so we could determine which responses are from SMEs, as our guide is targeting smaller businesses specifically. Determining how sustainable said SMEs are is more difficult to quantify. Sustainability is an extensive topic, and thus we had to find direct ways of measuring that. We decided to ask which companies tracked different environmental indicators, or if they tracked indicators at all, to understand the current state of sustainable business. We also asked if they had a budget for sustainability to determine whether they funded environmentally friendly practices. The quantifiable data was useful, but it was equally important to ask short response questions to understand the perception of sustainability and the specific challenges businesses faced. The following are examples of short answer questions in the survey:

- What environmental policies or strategies does your company have in place?
- What are some examples of sustainable practices already implemented within your company?
- What are some examples of the challenges to reaching sustainability within your company?

Although more difficult to analyze, including the open-ended question seen above was essential. There is a social and cultural aspect of sustainability that is difficult to understand with numerical data, and being able to read first-hand experiences from companies about the challenges and successes they encounter was valuable information in creating our guide. There is no one solution to the issues that all businesses can implement. Therefore, understanding individual businesses on the path to sustainability helped us identify more specific problems and solutions that may be applicable to other businesses.

3.3.2 Developing the Interview

In addition to the survey, the CICR set up our team with eleven different SMEs to interview on-site or via Zoom or Microsoft Teams. Each interview was semi-structured, where we arrived with a draft of questions while allowing the business owner to share any additional information they chose; we also asked relevant follow-up questions based on the information we learned throughout the process. Some interviews were conducted on-site, which allowed us to understand the business to a greater extent by asking questions brought up by touring the facilities in which they worked. The following are example questions from the interview:

1. What steps have been taken thus far to become more sustainable?
2. What manufacturing processes are the most resource-intensive (water, energy, fuel… etc.)?
3. Do you track environmental indicators and waste?
    a. If so, can you mention some of the indicators?
    b. How does your company use this data?
4. Are you involved in any social or environmental projects in your community?

To analyze the survey data, we developed Company Profiles, found in **Appendix D**. The profiles consist of a brief description of the company and what it does, followed by a list of bulleted notes about specific topics covered in the survey. The bulleted notes allow for a concise understanding of how the company is achieving or struggling to achieve sustainability in a multitude of ways. This is followed by a table of interview topics with a yes or no checklist, which we used to collect quantitative data from the qualitative interview structure. The table seen below:

Table 3-1

Template of company checklist of different interview topics and how they were answered.

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☐	☐	☐
Measure Carbon Emissions	☐	☐	☐
Currently Carbon Neutral	☐	☐	☐
Use Renewable Fuels or Biofuels in Processes	☐	☐	☐
Have Environmental Management System	☐	☐	☐
Have Certified Environmental Management System	☐	☐	☐
Involved in Social or Environmental Community Project	☐	☐	☐

Note: Each row on the table was a question asked during the interviews.

The above table was utilized for every interviewed company; after all of the interviews were conducted, the tables were combined into one value ranking in an Excel Sheet, which can be found in the Findings and Analysis Chapter.

3.3 Objective 3: Determine the most efficient and cost-effective methods for SMEs to transition to sustainable business practices.

Our goal for companies working alongside the CICR was to examine and assess the new data and determine the most efficient and cost-effective methods to transition their business. As 2050 approaches, Costa Rican companies must adhere to the goal of carbon neutrality. Thus, the transition to sustainable practices needs to begin as soon as possible. Considering this expectation, the data we collected needed to be synthesized and precisely analyzed. Given that many enterprises and companies work with CICR, the data received was subjective to each enterprise, given their size, resources, and previous sustainability practices. Not all companies have the same resources, and our guide adheres to the constraints of small and medium-sized enterprises. Therefore we needed to look for trends pertaining to small and medium-sized businesses.

The survey responses were collected in a Google Sheet to be analyzed in our Findings and Analysis chapter. These responses were also further separated with a section of the Google Sheet devoted only to the SMEs that responded, as the survey was sent out to every member of the CICR via their weekly newsletter. The interviews were analyzed in the Company Profiles mentioned in Section 3.2.2. The notes taken from these profiles were used to develop ideas that different businesses used that could be implemented into SMEs. They were also used to identify practices that already worked for the interviewed company and could be achievable for SMEs. The checklist data seen in Table 3-1 was completed for every company and combined into an Excel sheet found in the Findings and Analysis chapter to provide a tool for simple numerical analysis.

The survey and interview data contained critical information and invaluable insight for our guide. Synthesizing this data allowed us to find what practices were widely implemented and which methods worked the best for SMEs. We decided what inexpensive strategies companies can weave into their business plans using these ideas. It was necessary to make the sustainable options as inexpensive and feasible as possible to encourage SMEs to utilize our guide. However, transitioning to a more sustainable business model will ultimately fall on the company to follow manageable pieces of our guide while encouraging employee commitment to sustainability.

3.4 Objective 4: Develop a written guide detailing the process of switching to sustainable practices for SMEs.

We combined data collected through our surveys, company interviews, and accumulated background research to form a multi-platform guide that will aid businesses in transitioning to become more sustainable enterprises. The mission of our guide was to demonstrate accessible ways for SMEs to make sustainability achievable and even profitable. By framing sustainability as a ‘competitive edge’ in the market, business owners can see it as a long-term investment in their enterprise rather than a large business expense. Through interviews, our team gained first-hand experience speaking with and observing company and employee commitment to sustainability, examining simple practices SMEs could implement. The survey and interviews detected some economically advantageous and environmentally friendly sustainability practices that we included in our guide for SMEs.

The final step in our project was to create our multi-platform guide. The guide was not tailored to a specific industry but instead covered attainable business ideas for all SMEs. In our project timeline, we set a goal for a completed first draft of the guide by February 9th. However, we had not received adequate survey responses or completed enough interviews to accurately analyze and report our findings. Instead, we waited for at least 40 survey responses and interviewed 11 companies before beginning to analyze data. We stopped accepting survey responses on Friday, February 17, at midnight (CST) and developed the first draft of our guide for Monday, February 20. That Monday, we brought our draft to our sponsors for feedback, which we used to construct our final guide.

The guide consisted of two main parts: A written report of our findings and suggested changes and an infographic that contained the most relevant information. We constructed the report by examining survey and interview responses in two main areas; To start, we analyzed the data to determine common obstacles to sustainability for SMEs. Identifying areas that needed improvement allowed us to conduct more specific research into potential solutions. Conversely, we used our findings to recognize simple practices and successes that companies implemented into their business model. This allowed us to develop ideas and practices for our guide that other SMEs could easily adopt. This data was synthesized in our written report and the more concise infographic.

The goal of the infographic was to relay our suggestions to companies in a simple and easy-to-digest format. Reading an infographic is much less time-consuming, and much more engaging than reading a written report. Thus, employees are more likely to understand and retain information from the guide in their company. Thus, retention of ideas from the guide would be higher, and more SMEs would likely take steps toward more sustainable practices. Our sponsors also recommended our team construct a PowerPoint containing the most impactful data for our project. A decision that was made was to keep our PowerPoint under ten slides. This decision was based on the viewer's attention and how we wanted to relay our data. Having a PowerPoint on hand with our key findings, we were able to present a well-constructed report without spending too much time going into the minor details.

The goal of our multi-platform guide was to aid SMEs in the transition to and maintain a sustainable business model. The creation of the guide is detailed in the following chapter.

Chapter 4: Results & Analysis

This project aimed to work alongside the CICR to reach out to their member companies to interview and survey different enterprises about current and future sustainability practices. This chapter details the results of the completed research in conjunction with our surveys and interviews in Costa Rica. The CICR has a commission of over 700 businesses and companies; our sponsors aided us by including our survey in their weekly newsletter. Once the survey was closed, we received a total of 50 responses. Additionally, we were allowed to interview a total of 13 companies. These interviews were conducted on-site with an included tour of the facility or online. By identifying successes and challenges in sustainability in different companies, we were able to tailor our guide to SMEs.

4.1 Potential Sources of Error in Data Collection

The overall objective of our project was to develop a sustainability guide for the SMEs in the CICR. However, some of our data were not directly applicable to SMEs due to the size and available resources of the companies we interviewed and surveyed.

Although not a direct source of error, the lack of survey responses was a large issue when collecting data that may have negatively affected our data analysis. Every survey question was optional to encourage more companies to fill it out, even if they could not answer some questions. This was beneficial in encouraging more companies to respond but detrimental because the conclusions drawn came from fewer data points when companies chose not to answer a specific question. Additionally, the survey is anonymous, so we needed to know whether multiple employees from the same company filled out the survey. The potential for repeated responses from the same company could lead to errors at an unknown frequency that could skew our data. Repeated questions also shed light on some slight inaccuracies in our collected data. The answers to our survey depend on what the respondent knows about their company; The respondents might not have known every answer to every question, which may have negatively impacted our data.

As interviews are a qualitative data collection method, the potential errors are likely lesser than in the survey because many answers can be subjective. The interviews also allowed

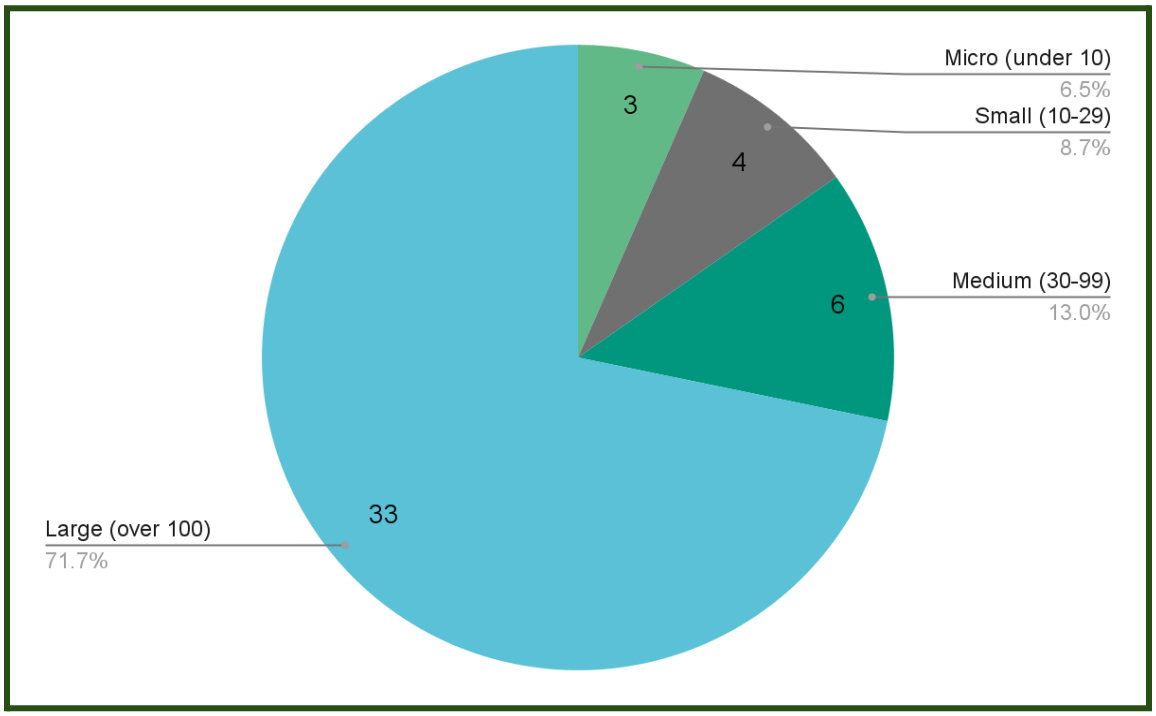
companies to elaborate on many aspects of their business model, which is a response that is unique to each company. We had the opportunity to interview only 13 of the 30 companies our sponsor contacted. Of these 13 companies, five are large, well-known international companies. These large companies often had a department that worked directly with sustainability, many of which employed environmental engineers. We were able to conduct these interviews with employees of these large corporations because they had the time and resources to meet with us during their day; smaller companies, however, did not always have the time to spare to meet with us. Thus, there can be faults in our guide's application to SMEs due to the overall demographics of the surveyed and interviewed companies.

4.1.2 Response Demographics in Survey

Every week, the CICR sends out a bulletin received by the over 700 companies within their commission. For three consecutive weeks, the survey was sent to their members; for the first two weeks, the survey link was put at the bottom of the bulletin with other articles and newsletters that CICR had from that week. For the final week, the survey was moved to the top of the bulletin to encourage more companies to notice and respond to the survey. After just one day, the number of survey responses doubled. The placement of the survey greatly impacted the quantity of responses.

Figure 4-1

Response demographics of survey respondents categorized into four different groups based on business size.



Note: Data pulled from survey responses to question two, "What is the current size of the organization? (Approximate)"

The survey data conveyed that a large majority of the companies that completed the survey (37 out of the 50 respondents, noting that four companies responded twice) were large businesses with over 100 employees; this presented an issue because large enterprises were not the focus of our study. Many large enterprises already had the funding, resources, and knowledge to commit to sustainable business practices. In fact, many of the large companies had their own department in charge of sustainability and environmental practices. The initial goal of this survey was to identify areas where SMEs lacked sustainability and needed help. Instead, the survey provided lots of information on what sustainability practices were already in place in larger companies. This caused us to shift our approach in how we used the survey data. We actively used the data we found from SMEs in our guide; for the data from large businesses, we analyzed their existing sustainable practices and recommended them to SMEs in our guide.

The lack of responses from SMEs is likely due to a lack of time and resources. Larger businesses with more employees often had departments devoted to sustainability, which made

filling out the survey easier. SMEs only accounted for 13 responses, whereas large businesses accounted for 37. Only three respondents were from micro companies, and four respondents were from small companies. Working with a small sample size meant the data was not as accurate as we had originally anticipated, as the responses only reflected the actions of a few SMEs. Therefore, it is important to consider the potential for errors within our survey data.

4.1.3 Selection Bias in Interviews

There will always be unforeseen issues in interviews, as the responses are hard to quantify. Another issue, however, arose in the selection of businesses to interview by our sponsors. Each company was selected by our sponsor, and she chose companies with employees she knew were likely to respond and be willing to interview. The companies chosen were, for the most part, large enterprises with existing sustainability infrastructure. In fact, many of the companies were also international, with branches or factories in Costa Rica. These larger companies have the resources and funding to devote to sustainability, whereas many SMEs may not have those resources. For example, one company had many large and expensive technologies, like Oil Free Air Compressors, Frequency Inverters, and a new Air Handling Unit, all of which were expensive equipment purchased to become more sustainable (see Company A in Appendix D.1). SMEs with less funding may be unable to make changes on such a large scale that companies like Company HELP or other larger companies can.

The goal of our interview process was to identify areas where SMEs lacked sustainability, as well as areas where SMEs excelled in sustainability. Using this information, we could make suggestions in our guide that would address the faults we identified and recommend the successes we saw. Interviewing large, already sustainable companies presented a challenge because it was slightly disconnected from SMEs that lack the resources large enterprises have access to. It is difficult to see the faults in sustainability in SMEs when only interviewing large companies. Thus, much of the interview data we collected is not directly related to SMEs. To adjust to this, we tried to identify the simpler and more cost-effective methods that large companies use that may be more applicable to SMEs.

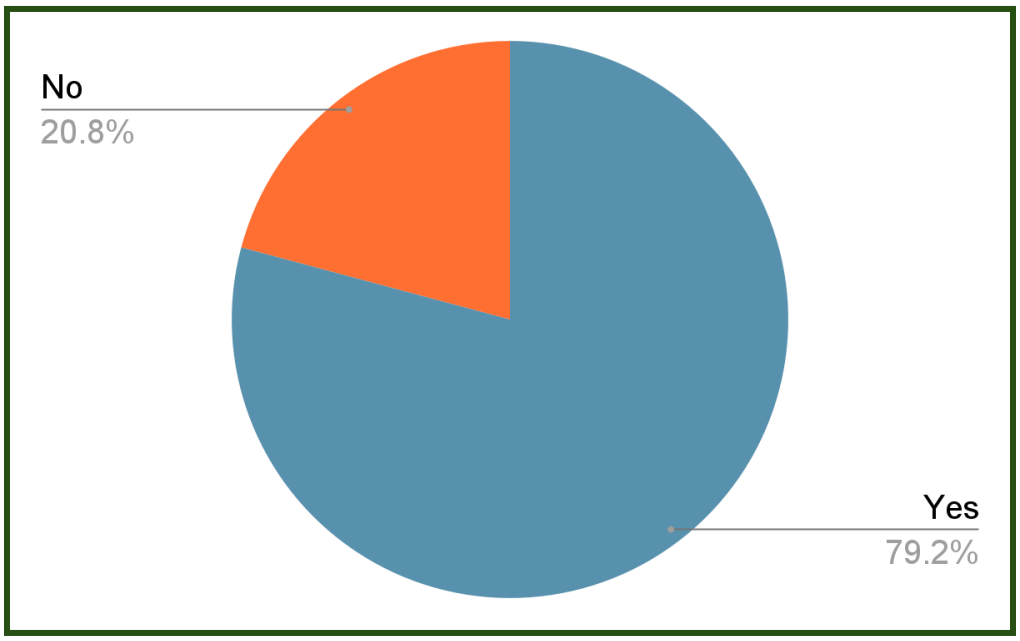
4.2 Survey Response and Feedback

The goal of the survey was to gain a significant amount of numerical data for analysis. As revisions were made, however, much of the data became qualitative. This was still useful but required more in-depth analysis to identify areas where companies excelled in sustainability, as well as areas where companies had room to improve. Due to repeated responses from companies in the survey, the results below analyze 46 of the 50 total responses.

4.2.1 Age Correlation with Size and Sustainable Practices

The first information we noticed is that age was heavily correlated to size; the longer the company has been in business, the larger the company was. The 20 companies founded between 1889 and 1972 were all large businesses (companies with over 100 employees). All 20 of these companies had established sustainability practices within their company. The oldest company that did not include any sustainability practices was a large business founded in 1983. While forming the questions, we wanted to investigate whether there was a correlation between company age and sustainability practices; we hypothesized that newer companies would be more sustainable due to the sustainable culture often seen in younger generations.

Figure 4-2:
Percentages of companies with/without sustainable practices founded after 1990



Note: This includes international companies founded before 1990 but brought to Costa Rica after 1990. The data was pulled from survey responses to question four: "Does your organization have environmental or sustainability policies or strategies?"

This was not the case. Looking at **Figure 4-2** above, only 4.3% of companies founded before 1990 did not follow sustainable practices, while 20.8% of companies founded after 1990 did not follow any sustainable practices. This can be attributed to the size of the company since the older companies were often larger; the newer companies, however, tended to be smaller and did not have the resources to apply sustainable practices to their business plans. Looking at the ages of all the companies, it is clear that age plays little effect on the implementation of sustainable practices; it is mostly related to size; if anything, the surveys show that newer companies are less likely to be sustainable.

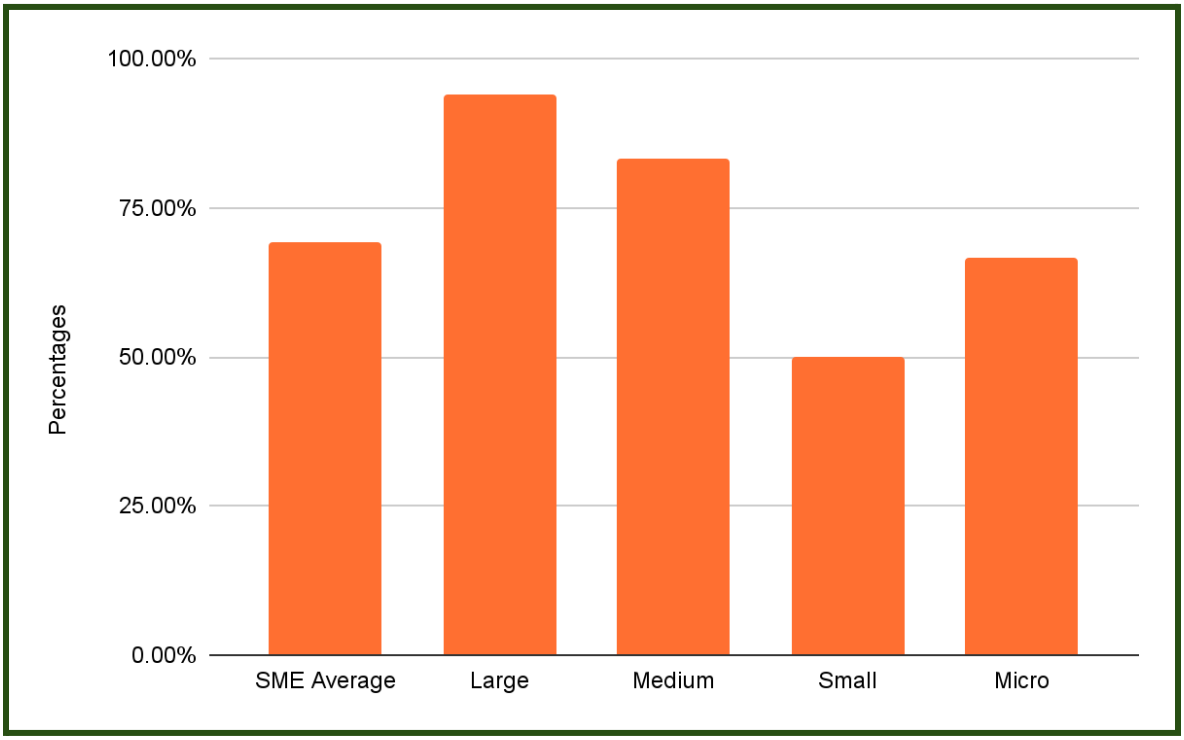
4.2.2 Size of the Company in Correlation with Sustainability Practices

As briefly mentioned in section 4.2.1, the survey found that the size of the company is indicative of sustainability efforts they are able to take; the larger the business, the more likely they are to implement environmental and social strategies into their business plans. Looking at the figure below, we can see the percentage of companies that incorporate sustainability practices

drop as we go from large, to medium, to small. Micro-sized businesses did happen to have a greater percentage of sustainable practices, but it is important to remember these numbers are based on only three responses from micro companies and four responses from small businesses. However, there is a clear trend of larger companies adopting sustainable practices for their business operations.

Figure 4-3

Percentage of Companies with Sustainable Practices Based on Size



Note: Percentage of companies that responded "yes" to question four in our survey: "Does your organization have environmental or sustainability policies or strategies?"

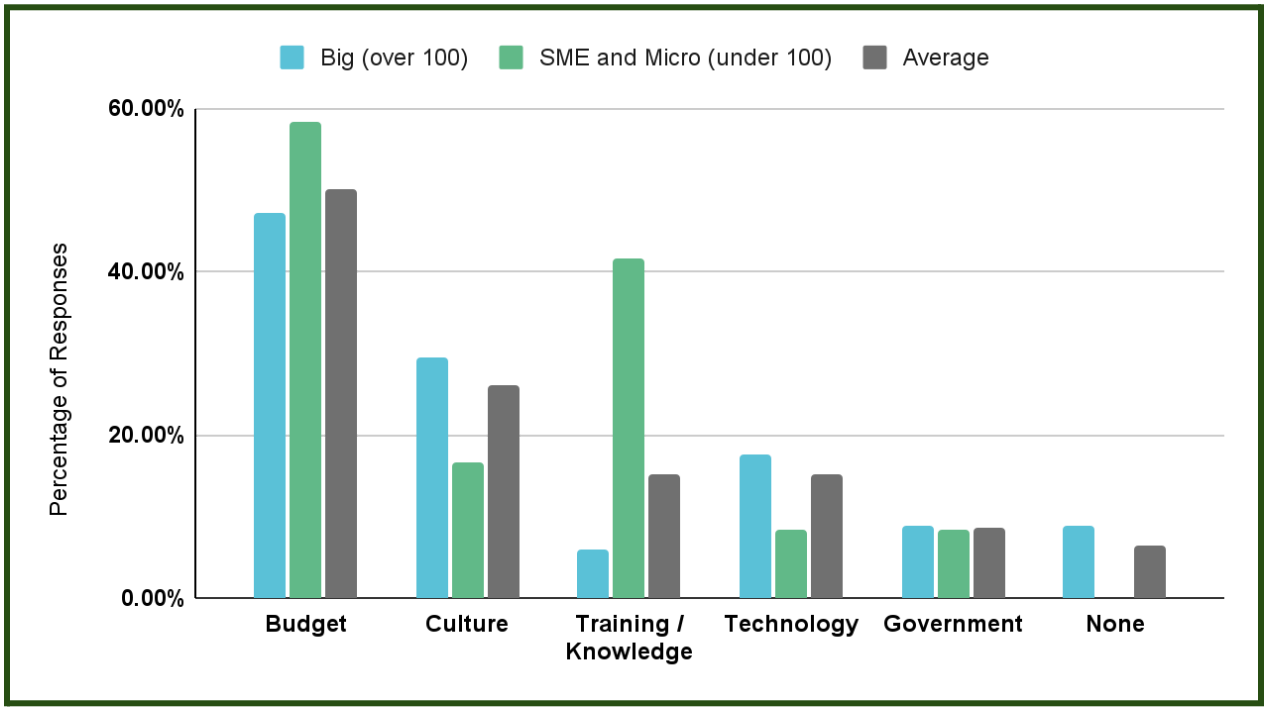
As seen in **Figure 4-3** above, 94% of large businesses follow at least some sustainable practices, while only 69% of SMEs follow sustainable practices. This could be expected since smaller companies often lack the budget and resources necessary to execute these practices. To investigate specific challenges these companies faced in implementing sustainable practices, the ninth survey question asked about the main issues with achieving sustainability.

4.2.3 Issues with Achieving Sustainability between Small and Large Businesses

Question nine of the survey asked respondents: "What are the main obstacles your organization has when implementing sustainable practices?" In total, the question had 34 respondents from large businesses and 12 respondents from SMEs. The chart below displays percentages of common obstacles to sustainability pulled from the survey responses and split up into three different categories: Responses from SME and micro businesses, responses from large businesses, and the average percentage of responses between the two.

Figure 4-4

Comparison between Large Companies (over 100 employees) vs SMEs and Micro-businesses (1-99 employees) in challenges when implementing sustainable practices.



Note: These answers are pulled from responses to question nine in our survey: "What are the main obstacles your organization has when implementing sustainable practices?"

SMEs and large businesses shared the same biggest issue: Budget. For large businesses, 16 of the 34 respondents, or 47% mentioned budget as an obstacle; similarly, seven of the 12 SMEs, or 58%, also mentioned budget. It was to be expected that budget would be the main deterrent for SMEs, as being a smaller company with fewer resources will make introducing costly new ideas more challenging. Likewise, budget being the biggest issue for large businesses was not surprising either; high-end sustainable technology will cut into profit, and no business is

eager to sacrifice earnings. The financial obstacle to sustainability was also seen in other areas of the survey; a more in-depth report about budget issues can be found in section 4.2.4.

After the budget answer, the responses were mixed between large businesses and SMEs. The second biggest issue for SMEs was training and knowledge, which was mentioned in 42% of the responses. These companies mentioned the following issues:

- "We have no knowledge to implement them [sustainable practices]"
- "[Lack of] knowledge in practical implementation"

Unsurprisingly, bigger businesses rarely mentioned training or knowledge, with only two responses mentioning training. These large businesses often had sustainability departments, with employees whose jobs were to create projects and train employees on sustainable practices. From the survey responses, it was clear that SMEs needed more training and education on business sustainability.

The third most mentioned obstacle by SMEs was company culture, which occurred in four responses. This was the second most common response for large businesses, which was mentioned ten times. Larger businesses likely have difficulty with culture because it is harder to spread information to a large number of employees. This could make sustainable transitions in company culture more difficult, especially for large businesses with different locations where cultures can vary. It was somewhat surprising that culture was the third most popular issue for SMEs, since they employ significantly fewer people. One response we gathered said, "Our company is small, but not all staff help these resource management practices, [and] more constant recycling." This may be explained by the previously identified training issue, where it is possible that employees were never taught or encouraged to follow sustainable procedures.

The third most popular response for large businesses was technology, which was mentioned six times; these answers were mostly related to the lack of available technology and the difficult transition to the use of complex machines and new production methods. SMEs only mentioned technology once, which may be due to differences in industry or processes within their company; larger manufacturing businesses, for example, require expensive technologies for their processes. Smaller companies, however, may have implemented simpler, lower-cost technologies that are not vital to the functioning of their business. For SMEs that struggle with expensive technology, this obstacle could also be encompassed in the budget response depending on how the respondent chose to answer the survey.

There were a few less common, but still notable, responses to the query of sustainability obstacles. Other large businesses felt they lacked the people power for sustainable companies, and some companies could not find waste managers or appropriate vendors to buy products from. One respondent answered:

> The main challenge we face is to find the appropriate allies to achieve our goals. These allies must fulfill the same responsibility that we have as a company in terms of sustainability and must meet a series of requirements to work with them.

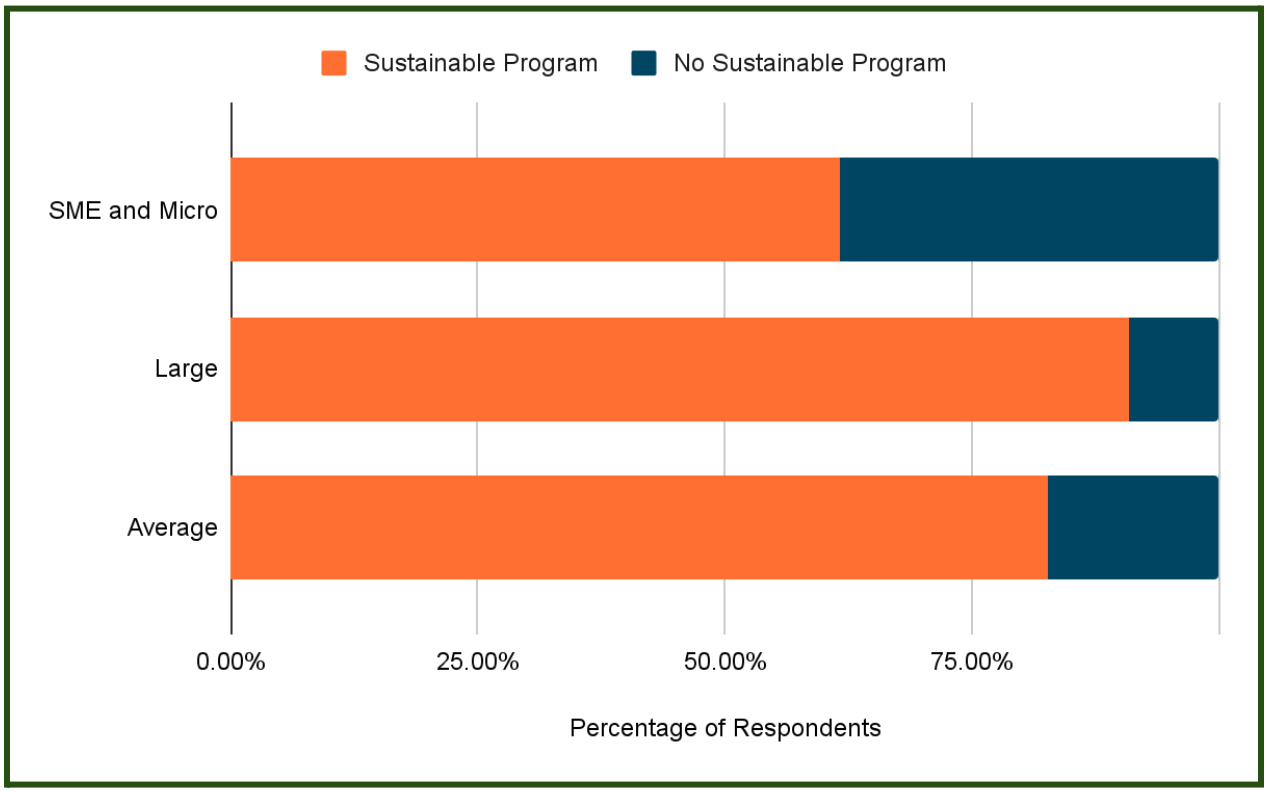
It was surprising this answer was not more common, but this is perhaps due to a lack of knowledge on the subject; sustainable supply chains are an integral part of the sustainability of the company itself, but they remain relatively uncommon. Another less common response cited the government as a barrier to eco-friendly practices. A few companies, big and small, mentioned issues with government regulations and needing to work around the government. The most surprising response was there were no obstacles to sustainability. Three large companies said they faced no issues, with one responding: "None, sustainability is a fundamental piece in the company's strategy." These responses are not reflected by a majority of the responders and were thus "taken with a grain of salt." There will always be some challenges with achieving business sustainability, and it was vital to consider the most widely faced obstacles in our guide.

4.2.4 The Effects of a Sustainability Department and Budget

The survey found that most companies had a sustainability department. Still, SMEs were less likely to have a department devoted to sustainability when compared to larger businesses. Of the 12 companies that did not have a sustainability department, five of them were SMEs. Four of these five companies did not have a budget devoted to sustainable practices. Only three of the seven large businesses that did not have a sustainable program also did not have a budget for sustainability. **Figure 4-5** below represents the percentage of companies with sustainable programs in orange and companies without sustainable programs in blue.

Figure 4-5

Percentage of Companies with or without Sustainable Areas and Departments Across Different Sized Companies



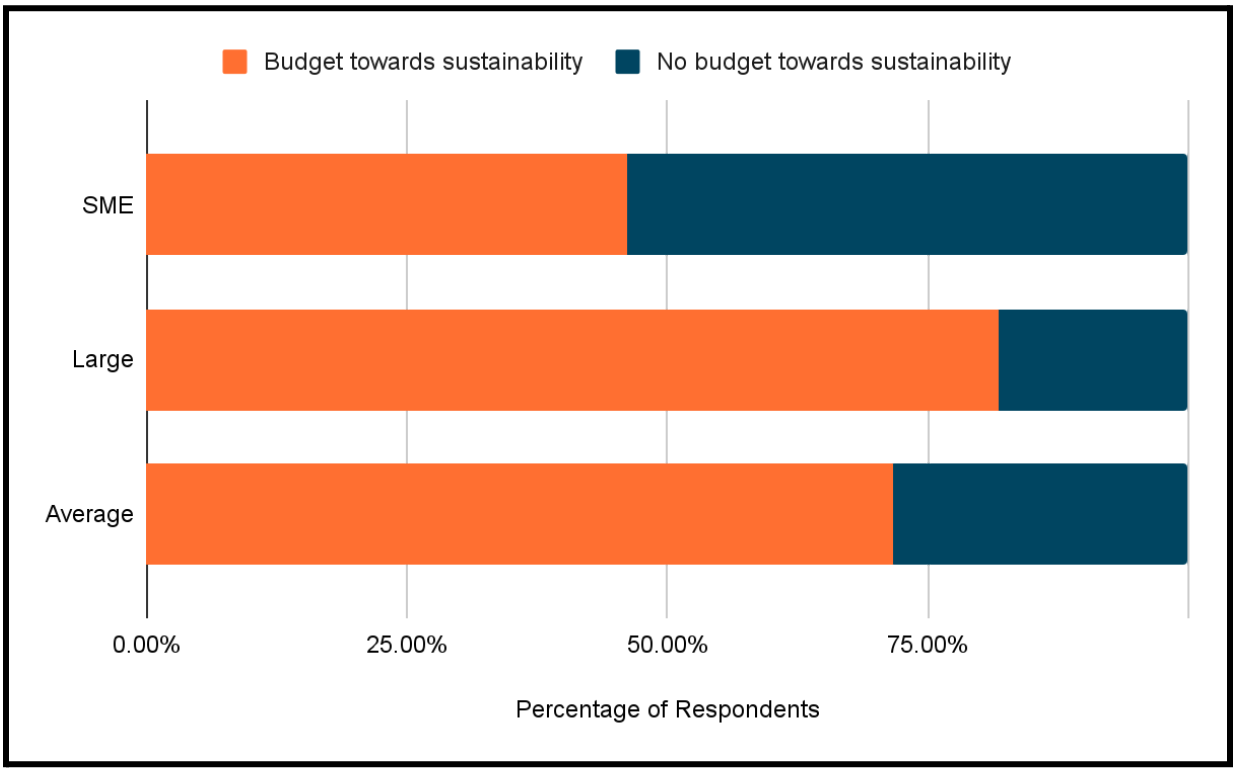
Note: Percentage of respondents that answered yes to question five: "Does the organization have an area in charge of sustainability issues?"

We defined a "sustainability area" or "sustainable program" as anything from a department of one person to an entire team working on sustainability within the company. Only 61% of SMEs had a sustainable area, while 82.6% of large businesses had an area dedicated to sustainability. The average number of people working in the sustainability department for SMEs was 1.5, while large businesses averaged 6.12 workers. The responses from large businesses ranged from 1 to 30 people working in their sustainability area, which skewed the average slightly; this could be expected, however, since some companies employed just over 100 employees while others employed thousands. Reviewing the data once more revealed that the median number of employees in the sustainability area was four employees, and the mode, the most common number of workers, was one.

The lack of a sustainability department in some companies often affected what environmental practices they followed. Our eighth question revealed that only five of the 46 companies did not track environmental indicators. All five of these companies did not have a sustainability area or a budget dedicated to sustainability. Four of these five companies were SMEs, while one was a large business.

Figure 4-6

Percentage of Companies with a Budget Dedicated to Sustainability Across Different Sized Companies



Note: Graph of the percentage of companies that have or do not have an area dedicated to sustainability, based on question six: "Does your organization have a budget assigned or aimed at the implementation of actions on sustainable issues?"

Figure 4-6 shows that just under 50% of SMEs have a budget, and five of the seven SMEs without a budget do not follow any sustainable practices. These companies were also less likely to answer question seven, which asked for examples of sustainable actions taken by their company. These companies also commonly answered that a budget was their main limitation in becoming more sustainable. Smaller companies are clearly being held back by a budget, as well

as previously mentioned factors such as knowledge and training. Furthermore, these companies were also less likely to be involved in sustainable social practices, referenced in section 4.2.6.

In contrast to SMEs, 81% of large companies, or 27 of the 33 companies, had a budget devoted to sustainability. As expected, large companies tended to provide more money towards their sustainable budget than small businesses. The budget of SMEs ranged from 0.5% to 10% of the total yearly budget, while bigger businesses ranged in responses from 0.1% all the way to 80%. The survey responses make evident the fact that smaller businesses struggle more with sustainability, with the main issue being budget. Thus, providing outside investment and knowledge to SMEs would be beneficial in their efforts to kickstart sustainable practices.

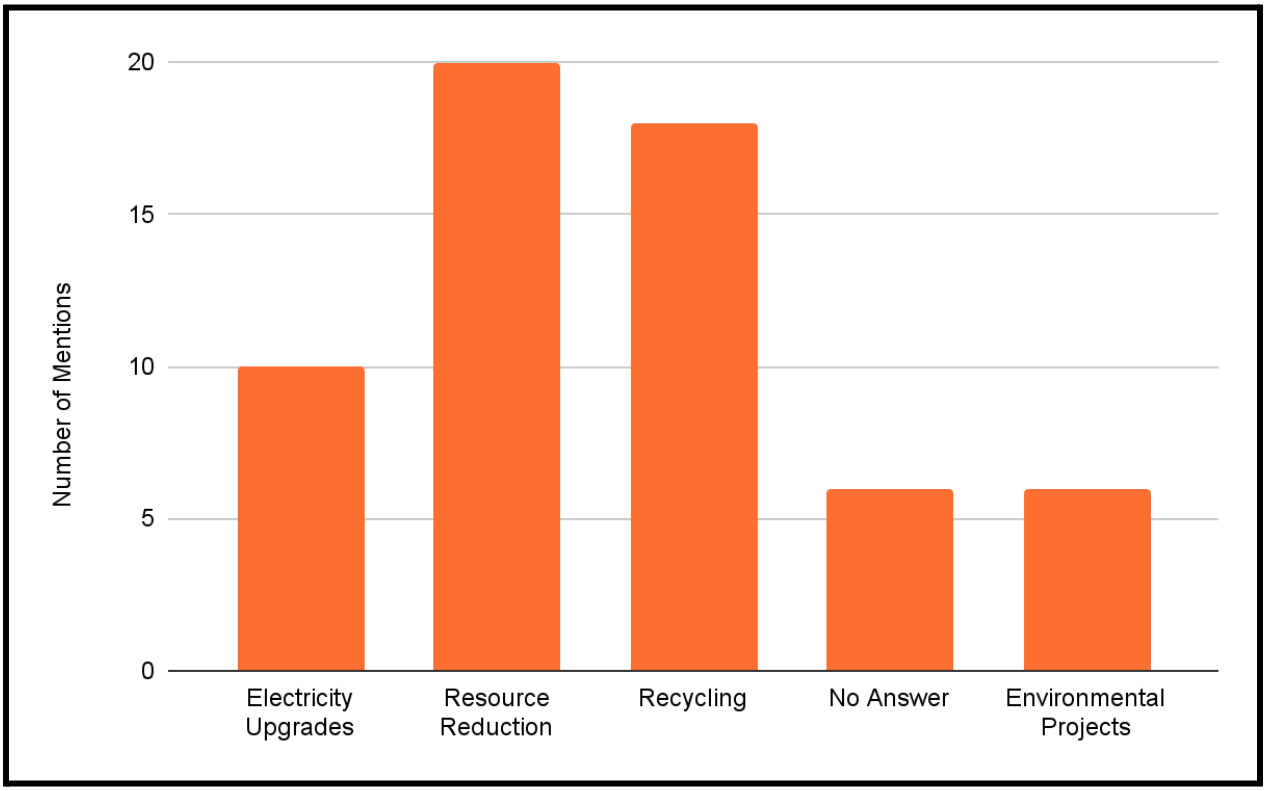
4.2.5 Current Sustainable Practices in SMEs versus Big Businesses

Question seven asked what current sustainable practices businesses had in place. A common theme in responses from SMEs was their commitment to recycling and proper waste management. Nine of the 13 SMEs mentioned this subject, while three companies did not list any practices. If this was not a mistake in filling out the survey, it could indicate a lack of knowledge of sustainability; the other answers from those three companies confirmed that none of them had a sustainability budget or any current sustainable practices. The outlier of the four companies that did not mention recycling instead mentioned environmental volunteering and seed sowing, a simple activity many SMEs can engage in.

Regarding their sustainable action, big businesses tended to answer with larger-scale practices, like generating electricity through biogas, transitioning to solar energy, or "automat[ing] processes and data collection for decision making." While some of those practices would be challenging for SMEs to introduce into their operations, we did receive some practices that were more accessible for SMEs. Recycling was a popular option for big companies, as nine of the 37 respondents mentioned some form of recycling as a practice. The responses from bigger companies were often more in-depth, complex, and specific to their industry. The most common response was increased measuring of resource consumption and increased reduction strategies, with over half, 20 of 37 respondents, of big businesses mentioning a form of resource conservation as a sustainable practice. Additionally, just under half of the responses listed energy conservation ideas. **Figure 4-7** below shows the most popular answers that we received.

Figure 4-7

Number of Times a Sustainable Practice was Mentioned by Respondents



Note: Commonality of responses from question seven: "What would be an example of good practices/sustainable actions recently carried out in your organization?"

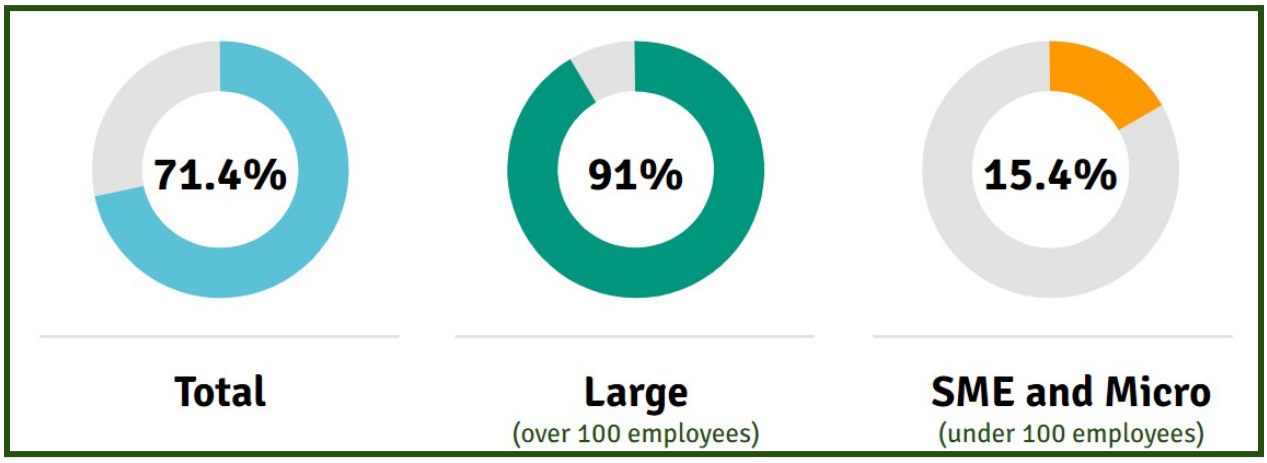
The most popular idea was resource reduction, which was only mentioned in responses from big businesses. The next was recycling, which was mentioned by both SMEs and large businesses. The third most popular was electricity upgrades to their facilities, again mentioned only by large businesses trying to cut down on energy usage through new technology or renewable energy systems. Lastly, environmental projects were mentioned six times, ranging from water reclamation to beach cleaning in other countries. Other ideas in the survey were: Following the idea of a circular economy, exploiting a 100% recycling program, or valuing 99% of the waste produced. Five of the answers were related to solar panels, but large-scale

construction of solar panels may not be the most feasible option for companies constricted by a tight budget. Some feasible ideas we received include “efficiency programs and waste reduction,” “analysis of water consumption and establishment of consumption reduction strategies based on modifications in productive processes,” and “decrease in consumption in various environmental parameters.” While these ideas are a bit more complicated than recycling, SMEs are capable of handling this added workload if it is implemented correctly. A decrease in the consumption of water, energy, and materials is also a good start for SMEs. Consumption reduction can decrease business expenses and act as a small step into sustainable business practices. An analysis of total resource consumption is a bit more time and budget intensive but would be a good second step after recycling, and reduction strategies have been enacted.

4.2.6 Social Projects

While often overlooked, the social aspect of sustainability is equally as important as the environmental and economic aspects. Creating a healthy environment is crucial to sustainability, but businesses also have a social responsibility to treat their employees and the community around them with care. The survey showed that social sustainability is not often overlooked by Costa Rican businesses, especially by large businesses.

Figure 4-8:
Percentage of Companies involved in Social Projects Based on Size



Note: Percentage of companies who responded yes to question ten: “Are you involved in social or environmental projects with your community? “.

More than two-thirds of the respondents reported that their company is involved in social work within their community. The companies that were not involved were mostly SMEs, with

SMEs making up 11 of the 14 respondents with no social involvement. Only 13 SMEs answered the survey, and only two of them participated in social projects. A potential reason that this number may be so low is a lack of awareness of social sustainability projects or help a company has provided in the past. Social programs in larger businesses are often advertised to a much greater extent than in smaller businesses. Additionally, respondents may not have considered certain projects to be socially sustainable, as the social aspect of sustainability is commonly overlooked.

Social sustainability isn't strictly about environmental projects or outwardly helping the community; it also involves treating your workers fairly. A future survey investigating this could ask for information regarding employee retention, as longer retention usually coincides with good working conditions, fair pay, and good treatment. As our data does not cover retention, however, we must consider the room for error in these responses while analyzing them accordingly. Although fewer SMEs said they were involved in social programs, there were still a number of projects by SMEs for the community. One of the projects mentioned by an SME was seed sowing, a project that many SMEs can undertake; planting seeds is not significantly expensive or knowledge-intensive.

When asked why they were not involved in social projects, SMEs listed a multitude of reasons, including the following:

- "Ignorance or lack of interest"
- "Limitation of human resources"
- "Didn't know of any offerings"
- "Their community hasn't requested help"
- "Lack of knowledge"
- "Have not considered it"

A large amount of these SMEs did not have a sustainability department, a budget for sustainability action, or significant knowledge of the topics of sustainability. From the responses, SMEs need ideas and outreach to participate in social projects outside of their individual companies. On the other hand, large companies had far more involvement in social projects; only three of the 33 large businesses did not have a social project in place. One company was working on creating a social project, one company shut down one idea, and another had not yet implemented a project. Despite these three outliers, the survey responses demonstrate how well

large businesses have encouraged social sustainability. SMEs have room for improvement in social projects in their communities, which was a point of impact addressed in our guide.

4.3 Interview Response and Feedback

The goal of conducting the interviews was to better understand the current sustainability progress in Costa Rican industries by receiving more detailed responses than in the survey. These responses helped us understand the reality of companies trying to be more sustainable from an employee perspective. Each interview provided insight into the most common sustainability practices being used by companies in the Costa Rican market, along with some struggles that the companies faced while trying to become more sustainable. In total, we interviewed 13 companies, three of which were SMEs, while the other ten were larger companies.

4.3.1 Findings from Company Profiles

After creating the company profile for every company we interviewed, we analyzed the similarities and differences between companies regarding sustainability practices (see Appendix D: Profiles of Interviewed Companies). The main findings from the company profile analysis are the following:

- Environmental certifications are useful and important
- Measuring environmental indicators is necessary for success
- Company culture has a large impact on sustainability
- Sorting waste correctly is complicated but necessary

These findings were common topics of conversation during most of the interviews, and many companies emphasized their importance and the role they play in sustainability.

Figure 4-9

Table of results for the company profile analysis

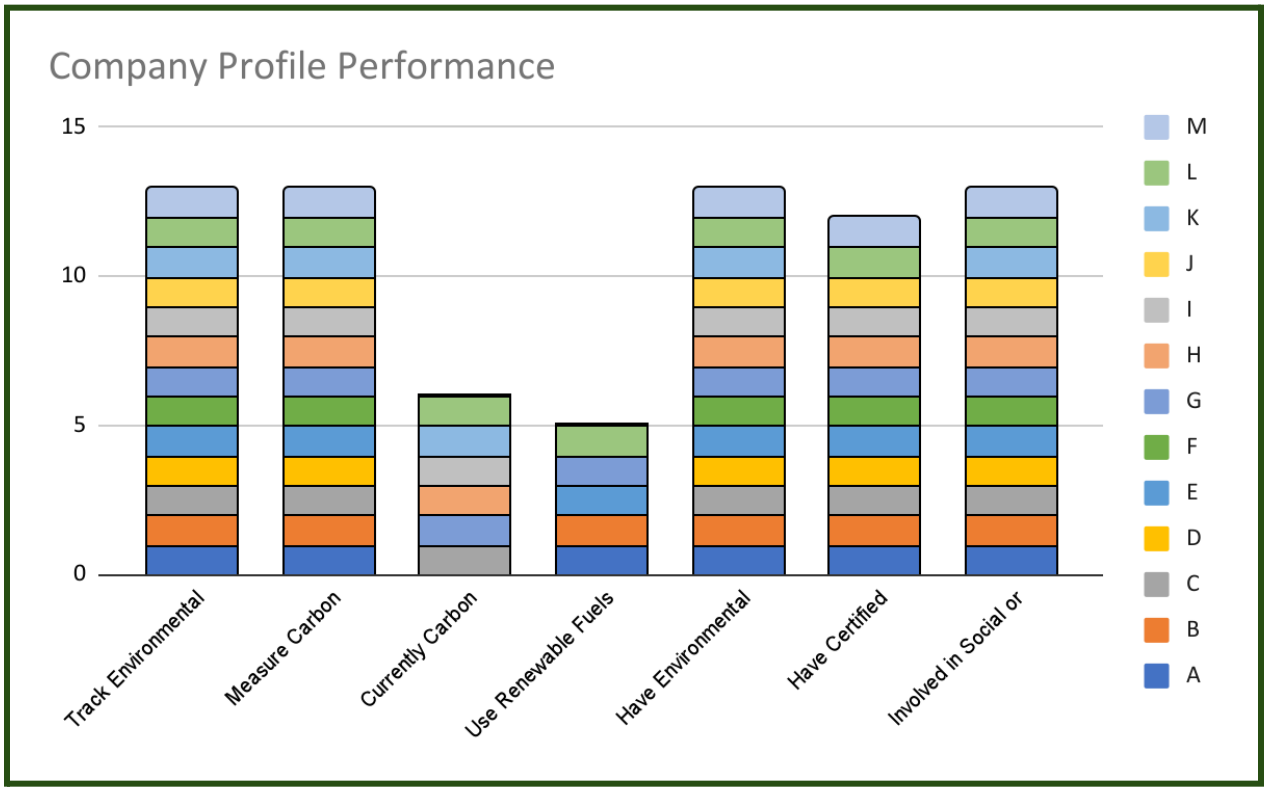
Company	A	B	C	D	E	F	G	H	I	J	K	L	M	Total	%
Track Environmental Indicators	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Measure Carbon Emissions	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Currently Carbon Neutral	0	0	1	0	0	0	1	1	1	0	1	1	0	6	46.15%
Use Renewable Fuels or Biofuels in Processes	1	1	0	0	1	0	1	0	0	0	0	1	0	5	38.46%
Have Environmental Management System	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Have Certified Environmental Management System	1	1	1	1	1	1	1	1	1	1	0	1	1	12	92.31%
Involved in Social or Environmental Community Project	1	1	1	1	1	1	1	1	1	1	1	1	1	13	100.00%
Total	6	6	6	5	6	5	7	6	6	5	5	7	5		

yes	=	1
no	=	0

Note: This data was collected for each of the 13 companies we interviewed. The data given during the interview was then compiled into an excel file based on the responses.

Figure 4-10

Company profile data graph



Note: Each company is assigned a color in the legend on the right, this data was collected throughout all our interviews from the Company Profiles.

By using **Table 3-1** from the methodology chapter, we were able to gather quantitative data that we input into an excel sheet. After gathering all the answers form the companies we

analyzed that data and realized that some practices were common in all companies. We found that the common practices amongst companies were following: track environmental indicators, measure carbon emissions, having an environmental management system and being involved in social or environmental community projects. After that, we analyzed the results which helped us with the previously mentioned findings.

4.4 Applying Relevant Data to Guide

The goal of the interviews and the surveys were to find the areas where SMEs could add low-cost strategies to increase their sustainability efforts. The guide consists of information compiled from research, survey and interview responses, and advice from our sponsors.

We realized that, for SMEs, funding was the main issue in achieving sustainability; this was followed by learning and knowledge on the subject. Thus, these obstacles had to be covered in our guide. Our first chapter in the guide relates to the logistics and operations of transitioning your business. Much of the information on this topic came from an interview with an advising company that had previously helped SMEs become more sustainable. This company informed us of the importance of performing an all-around company financial assessment as the first step toward sustainability. Assessing financials allows companies to understand what portion of the budget they are able to devote to sustainability. This section also includes a paragraph about educating your employees on sustainable practices, which will contribute to a positive company culture.

The second section of the guide details the importance of tracking environmental indicators. In order to reduce your environmental impact, you must track and understand your current impact through the use of these indicators. The data above demonstrated that environmental indicators were tracked by every interviewed SME, and 69% of surveyed SMEs. For the guide, we recommended starting by tracking the following commonly tracked indicators: Water consumption, energy usage, and emissions. These could later be expanded into more specific subsections. In our guide, we provided resources and advice for starting to track environmental indicators.

Next, our guide covered how to save money through renewable electricity sources. Two of our interviews provided great insight into low-cost electricity-saving options that are currently available on the market. Company K, for example, invested in sky-light diffusers and motion

sensor technology to reduce wasted electricity (see Appendix D.8 Company K); This not only reduces wasteful energy usage but saves money on the overall electricity bill.

Company K once again provided great ideas for reducing water consumption while increasing water conservation, which is detailed in the fourth section of the guide. Their water tank and collection system was inexpensive, and efficiently integrated into their facility; their low-cost water conservation systems are achievable for many SMEs. Additionally, numerous interviews from both large businesses and SMEs mentioned other water-efficient appliances and system upkeep that was applicable to the guide.

The fifth section of the guide covers waste management and recycling. Each interviewed company, and nearly 40% of the survey respondents, practiced some type of recycling process. While the survey did not provide exact examples, it exhibited that most SMEs were involved in recycling efforts. Through the interviews, we developed an understanding of important recycling practices that were included in our guide. For food waste, Company M gave us invaluable information on composting and how it could benefit businesses (see Appendix D.10 Company M). Composting and sorting recyclables are a few simple tasks that are achievable for SMEs and large businesses alike.

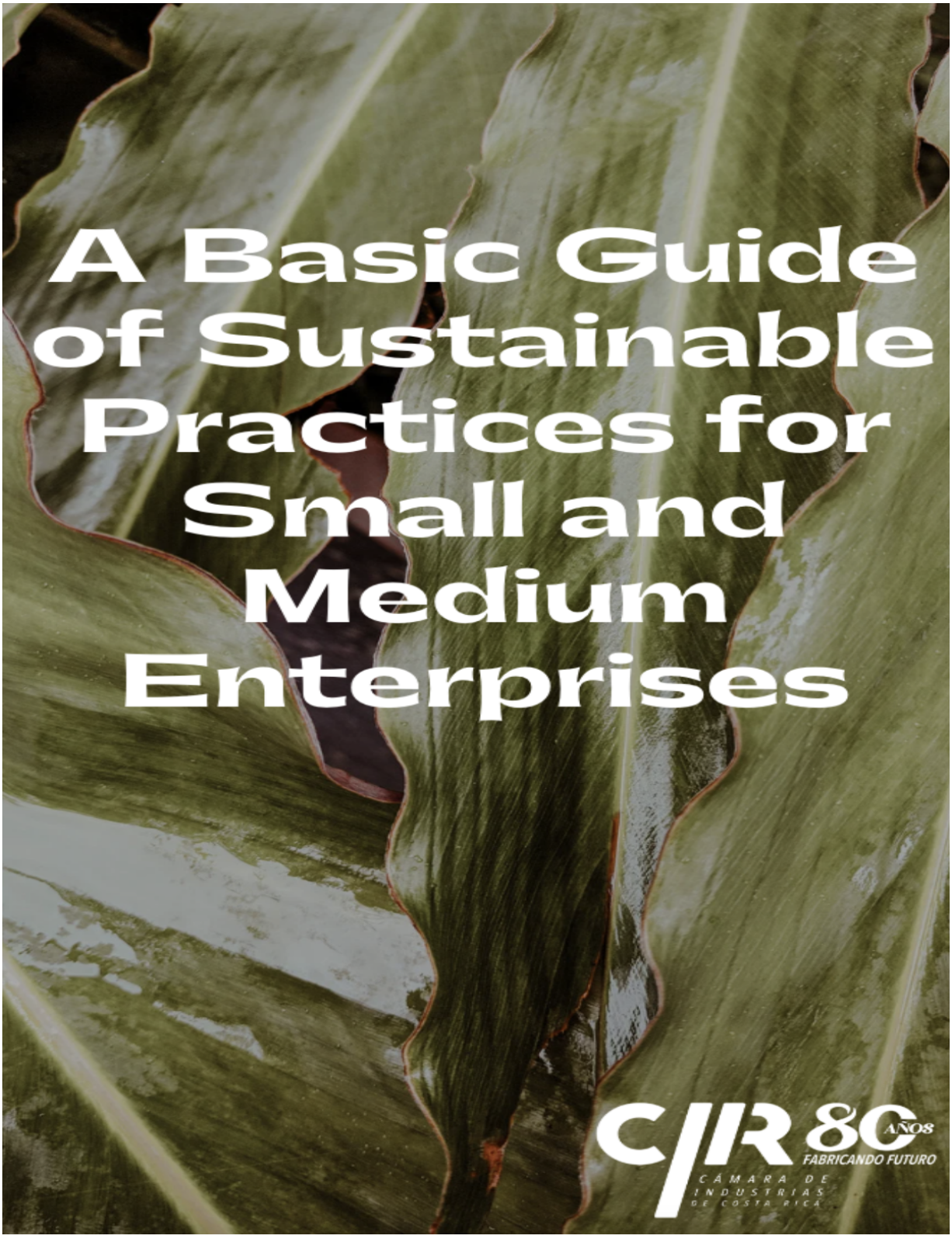
The social impact section of the guide was heavily informed by survey responses; the social sustainability data was sorted into feasible ideas for social projects that SMEs can engage in. Our sponsors also added to this section, noting the importance of developing a healthy work environment for employees. Some survey respondents confessed that their companies were not involved in social projects due to a lack of knowledge and further action.. Therefore, we used this section of the guide to give a few examples of cost-efficient ideas for SMEs to engage with their employees, and their community.

Lastly, we concluded with a section on general environmental impact. Many interviewees spoke of environmental certifications and the path it takes to get there. Thus we included a paragraph about striving for environmental certifications and following them as guidelines. Additionally, this section discusses the importance of ethical sourcing and sustainable supply chains. The interview with Company L revealed previous difficulties with sustainable sourcing but has a positive outlook for the future as more companies are transitioning to sustainability and considering more ethical sources (see Appendix D.9 Company L).

The guide in section 4.5 below is the English translation of the final guide submitted to the CICR and details the above strategies as well as more specific options to improve sustainability in SMEs.

4.5 Finalized Guide for SMEs

The following is the English translation of the completed written guide. A Spanish translation, and a supplemental slide deck can be found in **Appendix E** and **Appendix F** respectively.


A Basic Guide of Sustainable Practices for Small and Medium Enterprises
CIR
80 AÑOS
FABRICANDO FUTURO
CÁMARA DE INDUSTRIAS DE COSTA RICA

Sustainable Practices for SMEs

As climate change continues to threaten the planet, it is important to understand why we must combat it, and how business sustainability can positively contribute to that.

Climate change is a continuing issue the world is facing together. It is thus important to understand how, as a business, your company can impact the environment both negatively and positively. Not only will transitioning to more sustainable business practices make your company more environmentally friendly, but it will also improve marketability. Sustainability continues to be a marketable asset to different brands, as consumers continue to want more ethically sourced and eco-friendly products. Thus, sustainability can also grant a competitive edge to your business.

This guide was created in conjunction with a group of university students from Worcester Polytechnic Institute after a study of Costa Rican business sustainability was completed in February of 2023; it details seven areas where a business can become more sustainable, and was developed using data collected in surveys and interviews with different companies across the country. These solutions will provide simple avenues to positively impact the environment while still conducting a profitable business.

Additionally, we would like to thank the 13 interviewees who took time out of their days to educate us and answer our interview questions.

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LOGISTICS & OPERATIONS

Understanding the logistics and operations of current business practices is a fundamental first step in the transition to sustainability.

Before any sustainable action is taken, a comprehensive assessment of the state of the company should be completed.You need to get a strong understanding of the steps your company is able to take without going over budget. The following are the first logistical steps to take while looking to transition to sustainable practices:

Figure 1: The three different sections within analyzing the business. All three sections are relevant to ensure the success of your company

Analyze Financial Status

It's crucial to get an economic and financial assessment to see if a company is profitable enough to undertake the initial investment into sustainable practices. The first step is to identify income, and expense situations to avoid spending beyond your means. While the initial cost is steep, sustainable practices eventually pay for themselves. The ROI tends to extend for a long period of time, but as Costa Rica begins to implement and enforce more Carbon Neutral goals & policies, sustainable businesses will already be prepared.

Internal Assessment of Resource Usage

An internal assessment of resource usage helps identify the next steps to minimize carbon footprint and environmental impact. This can range from tracking carbon emissions of each individual product to looking at what current activities are being done to avoid or reduce waste.

Employee Education

Education is crucial for promoting awareness of sustainability within organizations. It increases awareness of environmental and social issues while promoting responsible citizenship. Train employees internally on sustainable practices or seek outside training by qualified groups.

Unified Company Culture

Building a sustainable culture means integrating sustainability into everyday decisions. A sustainable business should encourage a culture that rewards individual initiatives, actions, and commitments to sustainability. Break down habits into small milestones so employees get a sense of accomplishment which could lead to greater motivation. Reward sustainability in your company.

Triple Bottom Line

The triple bottom line is a way to measure your businesses social, environmental and financial impacts of your organizations activities. This can be done by conducting surveys and interviews to measure social impacts, evaluating financial statements and tracking carbon emissions or product life cycle assessments. The results can then be used to make informed decisions regarding sustainability operations and to evaluate a businesses sustainability performance.

ENVIRONMENTAL INDICATORS

The first step in becoming more sustainable is to measure your environmental impact.

Once the company assessment is completed, the next step is to implement a system to measure environmental impact. This can be a spreadsheet that tracks environmental indicators. This section will go over the four leading environmental indicators; this system is not restricted to four indicators, but is instead a recommended starting point that can be expanded latert:

Energy Recovery

Any method used in reducing the amount of energy overall in the company can be qualified as energy recovery. To track energy usage within the company, examine the energy usage report through your company's supplier and discuss possible ways to minimize single-use energies. As a long term goal, implement a yearly impact assessment in comparing these usage reports across all varieties of used energies. By measuring consumption in kilowatt-hours per unit (kWh/unit), you understand what products are the most energy intensive.

Water Consumption

Tracking water consumption can be seen through water usage statements provided by the supplier to eliminate areas that use excessive water. Identifying potential areas where water consumption is unnecessary or can be reduced will significantly impact the total water waste. Like electricity, measuring usage per unit or per kg is helpful in understanding what processes are the most wasteful in manufacturing. Using units like liter per kilogram (L/kg) of final product, or liter per unit (L/unit) of waste are helpful to understand waste.

Waste Products

Recovering waste products can be a rewarding process for the well-being of your company. Properly disposing of chemicals and storing hazardous materials safely makes the potential for dangerous waste slim. More information on proper waste disposal can be found in the Waste Section of this guide. The amount of waste should also be tracked in kilograms of waste per unit (kg/unit), or the ratio of kilograms of waste per kilogram of final product (kg/kg).

Recycling Percentage

Recycling is a crucial part of developing a sustainable business. Separate different items that can be recycled will aid your company in tracking recycling progress. Use the following formula to calculate your recycling percentage:

$$\frac{Monthly\ Recycling\ Quantity}{Monthly\ Solid\ Waste\ Quantity} = Recycling\ Percentage$$

ELECTRICITY

Managing electricity use effectively can help reduce the yearly cost of operations

In order to reduce the yearly cost of electricity, you can add technology that reduces electricity usage or generates electricity internally to reduce cost. The following are low-cost ideas to reduce electricity consumption in working spaces:

Natural Light Diffusers

Installing skylight diffusers in the ceiling of the workspace can help reduce electricity consumption during the day by utilizing natural sunlight. However, it needs to be paired with a non-natural system to compensate for lower light levels at different times of day.

LED Lights

Changing your traditional light bulbs for LEDs can help reduce electric costs since LEDs are more energy effective and last longer.

Motion Sensor Technology

Motion sensor devices can be a useful tool in any workspace to regulate electricity consumption by turning devices off when activity in a room is not detected. They can be used for lights and AC units to reduce unnecessary usage.

Solar Panels

Solar panels can help you save money on electricity internally. A basic solar panel system in Costa Rica can cost from $7,000 to $8,000. However, the yearly savings in electricity bills will eventually cover the initial investment. Depending on your system's size, it is possible to save from 30% up to 95% in electricity bills using solar panels.

Figure 2: Solar Panels Installed on a roof

Solar Water Heaters

A solar water heater can raise the initial temperature of the water before being used in manufacturing. These heaters put less load on a boiler, drawing less energy to get to the boiling point or necessary temperature for production.

WATER

Water conservation in businesses can lower costs, reduce environmental impact, and demonstrate corporate social responsibility.

Water is a vital resource used in various operations and processes. Installing water systems, like the ones listed below, can reduce your business's consumption, which can benefit your budget and the environment. The following section details different ideas for water conservation:

Water Efficient Appliances

There are many water-efficient fixtures and appliances on the market currently, with inexpensive options such as low-flow toilets, urinals, and faucet aerators. On a larger scale, businesses can invest in water-efficient equipment like high-efficiency boilers and cooling towers. If feasible, companies can replace existing valves with low-flow valves and fittings.

Water Collection Methods

Water collection methods are an effective measure to capture and conserve water. You can harvest rainwater from the roof through a gravity-fed system into a supply tank. Capture excess water that is produced by air conditioning units or dehumidifiers. Businesses can use this recycled or reclaimed water for non-potable purposes such as landscaping, cleaning, and other industrial processes.

Figure 3: This tank is a rainwater collection system. It can be used in different manufacturing processes.

Water System Upkeep

Well-maintained systems operate more efficiently, using less water and energy to deliver the same level of service. Companies should conduct regular system checks to ensure water is not wasted by faulty equipment. Another option is to implement a leak detection and repair program.

WASTE

Companies will always produce some form of waste; by properly managing as much waste as possible, your company will become more sustainable.

Every company needs to focus on reducing their waste. Additionally, waste must either be properly disposed of or reused. The following are methods to dispose of or reuse waste:

Hazardous Waste Disposal

In order to dispose of hazardous waste, you must identify the type of hazardous waste that is being produced. Next, you must contact a waste management company to properly dispose of the hazardous materials. The following is a short list of types of hazardous waste:

- *Batteries*
- *Used oils & lubricants*
- *Refrigerants*
- *Home appliances*
- *Medical appliances*
- *Chemical waste (inflammatory, corrosive, oxidizing)*

Recycling center

Every company should try to recycle as much waste as possible. A company can either send their recyclable waste to a waste management company that will process and recycle the waste, or they can reuse their waste in their processes. If a company recycles its own waste, it is key to have a recycling center or protocol in place. The waste needs to be sorted and cleaned before it is reused or repurposed.

Figure 4 : An example of how all recycled products can be sorted into different categories.

Composting

Composting is an easy and cost-effective process that SMEs can use in their sustainability processes. By composting, companies can repurpose their organic waste into compost that can be used by the employees or donated to local farmers and families. A medium size composter that holds 35 kilos of organic waste can cost from $700 to $800 in the Costa Rican market, a smaller option can go for $200. It is important to follow the composting process properly in order to avoid issues.

SOCIAL IMPACT

The social aspect of sustainability is often neglected but is necessary for a healthy work environment.

As business owners and employees, engaging with the community around you is important. Social projects for the public good are necessary to maintain healthy relationships with the community and positively impact the environment. The following are low-cost ideas to engage with the public and improve the area around you:

Develop a Healthy Working Environment for Employees

To have a positive social impact on the community outside the business, you must ensure that things are running smoothly internally. Make sure your employees have a healthy and happy working environment where they are treated with respect.

Donate Old Equipment to Schools, Libraries, or Other Public Organizations

Old computers, monitors, and other office supplies don't need to be thrown away. They can instead be donated to others who need them.

Work with Schools, Universities, and Local Education Providers

Offer to give tours of your facility to students or to speak to students on-site to engage with the community and education in the area.

Volunteer for or Organize Environmental Cleanup Campaigns

Lead or participate in efforts to clean trash from beaches, forests, and city streets.

ENVIRONMENTAL IMPACT

Every company has an impact on the environment, and by becoming sustainable your company can positively aid the environment.

The environmental impact of a company can be divided into two types, direct and indirect. Direct impact is the result of the company's processes, and indirect impact comes from outside of the company, usually from other entities.

Carbon Offset

Carbon offsetting is a process in which companies invest in initiatives that can compensate for their own carbon emissions. This does not mean that the company's emissions are being reduced, but it means the company is compensating for its own emissions by financing projects that can benefit the environment. The UCC-FONAFIFO program by FONAFIFO manages carbon offsetting, and provides resources to reduce carbon footprints.

Environmental Certifications

Environmental certifications dictate a guideline for companies to follow that can facilitate the process of setting up an environmental management system. Some of the most common certifications in Costa Rica are the ISO 14001, the Certificacion Carbono Neutral, and the Bandera Azul Ecológica . It is common for companies to hire a consultant specialized in certifications who can help the company take the necessary steps to become certified. Hiring a consultant can also reduce the time to get the certification, which can often be from six months to a year depending on the company's current sustainability structure.

Ethical Sourcing from Sustainable Supply Chains

Sourcing from sustainable supply chains is a form of indirect impact. Ethical sourcing requires businesses to ensure that products and raw materials are made by suppliers who adhere to environmental and social standards, such as fair labor practices and responsible resource management. These supply chains seek to minimize environmental impact during the entire lifespan of a product: Production, transportation and disposal.

References

Figure 1: Triple bottom line diagram

El desarrollo sostenible: Pensar integralmente, hacer en común. (n.d.). Cepei. Retrieved March 1, 2023, from https://cepei.org/documents/desarrollo-sostenible/

Figure 2: Example of solar panel system

SELÉCTRICA. (2019, June 17). Ahorro en factura eléctrica con Paneles Solares en Costa Rica| Seléctrica Paneles Solares Costa Rica. *Seléctrica*. https://selectrica.net/ahorro-con-paneles-solares-complejo-deportivo/

Figure 3: Water collection system

Sistema de captación de agua de lluvia para usar como agua potable. (2022, October 9). https://ecoinventos.com/sistema-de-captacion-de-agua-de-lluvia-para-usar-como-agua-potable/

Figure 4: Example of sorting system

Aconcagua, I. (n.d.). *Súmate al estilo de vivir en un Punto Limpio—Inmobiliaria Aconcagua*. Súmate al estilo de vivir en un Punto Limpio - Inmobiliaria Aconcagua. Retrieved March 1, 2023, from https://www.iaconcagua.com/articulos/puntos-limpios

Chapter 5: Final Conclusion & Further Recommendations

The objective of our project was to create a guide for small and medium enterprises to transition to sustainable business practices. In this chapter, we will present the key findings which informed our guide, as well as recommendations for the future based on those observations (see Chapter 4 for a more detailed review of findings and the final guide). Throughout our seven weeks in Costa Rica, we set out to understand the state of SMEs across the country in order to develop a guide tailored to their needs. Although our studies were meant to focus on SMEs, we developed a deep understanding of large companies as well, which informed our results in unexpected ways. Through our surveys and interviews, we concluded that the largest barriers to SMEs' sustainability are funding, training and knowledge, and company culture. We will begin, however, by examining SMEs' successes.

5.1 Successes in Sustainable Development for SMEs

Our research determined multiple points of success where companies were including sustainable practices in their business models. Many of the interviewed and surveyed companies track environmental indicators, which is a necessary first step in taking action to benefit the environment. The most commonly tracked indicators by SMEs were waste generation and energy consumption. We recommend they continue to track these indicators and expand into tracking water consumption and emissions. This will improve knowledge of what resources are being used and where companies can create strategies to cut down on waste.

Another achievement for many SMEs were their company recycling programs. Nine of the 13 SMEs in the survey mentioned that they practiced recycling, and eight of those nine included recycling their business operations. SMEs should continue and encourage internal recycling as a simple method to improve company-wide sustainability. Additionally, we recommend that companies properly sort their recyclables to reduce waste that goes to landfills. We also recommend that companies properly dispose of hazardous waste through a third party if they do not have a sustainable method of disposing of waste on their own.

5.2 Obstacles to Sustainable Development

While many SMEs had implemented sustainable practices into their business model, there were still plenty of challenges in becoming environmentally friendly. The main obstacle for SMEs was a lack of money devoted towards sustainability, followed by a lack of knowledge on the subject. These issues can go hand in hand, as a lack of budget or resources makes hiring advisors or paying for training more difficult. Budget likely affected other factors in business sustainability as well. From the survey, all SMEs that did not track environmental indicators did not have a sustainability budget; each SME with a dedicated budget, however, tracked at least one indicator. Additionally, the companies without a budget did not participate in social projects or have a sustainability department. Without a position dedicated to sustainability, it is difficult to coordinate events and education for employees. We aimed to address these issues in our guide by providing cost-effective and simple measures that all SMEs can adopt.

5.2.1 Addressing the Cost of Business Sustainability

In our surveys and interviews, larger enterprises confirmed that, similar to SMEs, budget was still an issue for achieving sustainability. Many of the products used in larger companies to save energy and mitigate emissions were high-tech and expensive. This was compounded by the fact that newer equipment often had to be imported, further increasing the price.

To address this issue, we recommend that the CICR and its members campaign for governmental aid in transitioning smaller businesses to a more sustainable model. Although expensive, sustainable business practices are vital to maintaining a safe and healthy working environment while minimizing environmental impact. Our guide details low-cost methods for becoming more eco-friendly, but these can only go so far. The Costa Rican government needs to better financially support SMEs that are making the change to become more sustainable. Additional financial support could come in the form of grants for costly equipment, updated monetary incentives for sustainable practices, and funding of educational programs.

5.2.2 Providing Education and Improving Sustainability Culture

Funding educational programs will be especially useful, as the second largest obstacle identified in our survey was a lack of education and training regarding sustainable practices. Many responses dictated the lack of both resources to train employees on sustainable business

methods, and employee commitment to sustainability in general. This obstacle directly contributes to the third largest barrier identified, company culture. When employees are not educated on sustainability, they are less committed to transitioning to sustainable practices.

To address this education and culture issue, we recommend the CICR investigates providing training programs for SMEs. The lack of resources identified in the cost section makes it difficult to educate employees internally on sustainability. Thus, the CICR should develop a program themselves, or reach out to a third party, to provide free or low-cost training and education programs for SMEs. These programs should include notable topics, such as how to track environmental indicators and thus reduce waste and emissions. Training SMEs will allow them to develop their own sustainable projects more successfully, while encouraging a commitment to sustainability in the long-run.

5.3 Final Conclusions and Opportunities for Future Project Work

Our guide will not solve every sustainability issue for SMEs. It offers simple strategies and methods for reducing environmental impact, but can only go so far, especially since it is up to individual enterprises to follow it. Thus, the CICR must continue to work with SMEs as they transition to more sustainable practices. It is vital that the Chamber continues to investigate possibilities for smaller companies to mitigate carbon emissions, develop environmental management systems, and reduce their overall environmental impact while still conducting business. While our team was fortunate to interview and receive survey responses from some SMEs, much of that data was overshadowed by larger enterprises with more resources and funding. Although useful, our data was not as specific to SMEs as we had hoped from the beginning. We recommend that future IQP projects do more hands-on work with SMEs to recognize more specific areas for improvement. As more research is done by future project teams, the CICR can help develop resources to transition their members into sustainable enterprises effectively.

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Appendices

Appendix A: Survey Iterations

A.1 First Draft of Survey

What is the name of your company?
Answer

When was your company founded? (year)
Answer

How many employees does your company have? (an estimate is fine)

- ☐ *Micro (less than 10 employees)*
- ☐ *Small (10-19 employees)*
- ☐ *Medium (20-99 employees)*
- ☐ *Large (over 100 employees)*

What does your company do?

- ☐ *Food Industry*
- ☐ *Manufacturing*
- ☐ *Service*
- ☐ *Government*
- ☐ *Agriculture*
- ☐ *Construction*
- ☐ *Finance/Insurance*
- ☐ *Healthcare*
- ☐ *Other:*_____

On a scale of 1-10, how sustainable would you say the company is? (1 being the least sustainable, 10 being the most sustainable)
Answer

What sustainable practices are already in practice within your company? (if any)
Short Answer

What are the biggest challenges to reaching sustainability within your company? (if any)
Short Answer

A.2 Second Draft of Survey

1. When was your company founded?
   (*YYYY)*

2. How large is your company? (an estimate is fine)
   - ❑ *Micro (less than 10 employees)*
   - ❑ *Small (10-19 employees)*
   - ❑ *Medium (20-99 employees)*
   - ❑ *Large (over 100 employees)*
   - ❑ *Other:_____*

3. What does your company do?
   - ❑ *Food Industry*
   - ❑ *Manufacturing*
   - ❑ *Service*
   - ❑ *Government*
   - ❑ *Agriculture*
   - ❑ *Construction*
   - ❑ *Finance/Insurance*
   - ❑ *Healthcare*
   - ❑ *Other:_____*

4. What environmental policies or strategies does your company have in place?
Short Answer

5a. Do you have a specific budget for sustainability-related items?
   - ❑ *Yes*
   - ❑ *No*
   - ❑ *Other:_____*

5b. Can you estimate the approximate percentage of the annual budget for sustainability?
__% and/or $__

6. What are some examples of sustainable practices that are already implemented within your company?
Short Answer

7. Within your company, what environmental indicators do you track?
   - ❑ *Energy consumption*
   - ❑ *Water consumption*
   - ❑ *Material consumption*
   - ❑ *Greenhouse gas emissions*
   - ❑ *None*
   - ❑ *Other:_____*

8. What are some examples of the challenges to reaching sustainability within your company?
Short Answer

9. Please provide your email if you would like to receive the results of this study.
Short Answer

A.3 Final Draft of Survey

Survey

Hello, we are a group of university students from Worcester Polytechnic Institute (WPI) located in Massachusetts, USA. Our goal is to develop a guide for Costa Rican businesses to become more sustainable and more competitive in a sustainable market.

Your responses will aid our team in detecting the obstacles to sustainability and determining useful practices already in place. **All responses are anonymous to protect businesses.** We would appreciate it if all questions were answered honestly to ensure the quality of our data.

1. When was your company founded?

(YYYY)

2. How large is your company? (an estimate is fine)

- ❑ *Micro (less than 10 employees)*
- ❑ *Small (10-19 employees)*
- ❑ *Medium (20-99 employees)*
- ❑ *Large (over 100 employees)*
- ❑ *Other:_____*

3. What does your company do?

- ❑ *Food Industry*
- ❑ *Manufacturing*
- ❑ *Service*
- ❑ *Government*
- ❑ *Agriculture*
- ❑ *Construction*
- ❑ *Finance/Insurance*
- ❑ *Healthcare*
- ❑ *Other:_____*

4. What environmental policies or strategies does your company have in place?

Short Answer

5a. Do you have a specific budget for sustainability related items?

- ❑ *Yes*
- ❑ *No*
- ❑ *Other:_____*

5b. Can you estimate the approximate percentage of the annual budget for sustainability?
__%

6. What are some examples of sustainable practices that are already implemented within your company?
Short Answer

7. Within your company, what environmental indicators do you track?

- ❑ *Energy consumption*
- ❑ *Water consumption*
- ❑ *Material consumption*
- ❑ *Greenhouse gas emissions*
- ❑ *None*
- ❑ *Other:_____*

8. What are some examples of the challenges to reaching sustainability within your company?
Short Answer

9. Please provide your email if you would like to receive the results of this study.
Short Answer

A.4 Spanish Translation of Final Survey

Encuesta

Hola, somos un grupo de estudiantes de Worcester Polytechnic Institute (WPI) una universidad ubicada en Massachusetts, USA. El objetivo de nuestro proyecto es crear una guía para industrias costarricenses con la cual puedan mejorar sus prácticas sostenibles y cómo ser más competitivas en un mercado sostenible.
Sus respuestas nos ayudarán a identificar los principales obstáculos presentes en las industrias para implementar prácticas sostenibles y también a identificar buenas prácticas implementadas y casos de éxito.
Todas las respuestas serán anónimas.
Agradecemos que todas las respuestas sean honestas y transparentes para garantizar la calidad del estudio.

1. ¿En qué año fue fundada la organización?
(YYYY)

2. ¿Cuál es el tamaño actual de la organización? (Un estimado)

- ☐ *Menos de 10 empleados*
- ☐ *Entre 10-29 empleados*
- ☐ *Entre 30-99 empleados*
- ☐ *Más de 100 empleados*
- ☐ *Otro:_____*

3. ¿En qué área se especializa su organización?

- ☐ *Alimentos*
- ☐ *Manufactura*
- ☐ *Servicios*
- ☐ *Instituciones gubernamentales/empresas estatales Agroindustria*
- ☐ *Construcción*
- ☐ *Finanzas/Aseguradoras*
- ☐ *Medicina/Farmacéutica*
- ☐ *Otro:_____*

4. ¿Su organización cuenta con políticas o estrategias ambientales o de sostenibilidad?? Cuáles?
Si o no :_____Respuesta

5a. ¿Su organización cuenta con presupuesto asignado o dirigido a la implementación de acciones en temas sostenibles?

- ☐ *Si*
- ☐ *No*
- ☐ *Otro:_____*

5b. Si la respuesta es sí, ¿cuál sería el porcentaje aproximado del presupuesto? (si no puede indicar el valor total usado para las prácticas sostenibles)

__%
__$

6. ¿Cuál sería un ejemplo de buenas prácticas/acciones sostenibles realizadas recientemente en su organización ?

Respuesta

7. En su organización, ¿qué indicadores ambientales se miden?

- ☐ *Consumo energético*
- ☐ *Consumo de agua*
- ☐ *Generación de residuos*
- ☐ *Generación de emisiones y gases de efecto invernadero*
- ☐ *Ninguno*
- ☐ *Otro:_____*

8. ¿Cuáles son los principales obstáculos tiene su organización para implementar prácticas sostenibles?

Respuesta

9. ¿Están involucrados en proyectos sociales o ambientales en su comunidad? ¿Desde hace cuánto tiempo?

Respuesta

10. Por favor anote su email si desea recibir los resultados del estudio.

Respuesta

Appendix B: Interview Iterations

B.1 First Interview Draft

1. How committed is the company to achieving sustainability?
    a. How committed are the employees to this goal?
2. What steps have been taken thus far to become more sustainable?
    a. What are some examples of sustainable business practices in your company?
3. What are the biggest challenges your company faces in becoming more sustainable?
4. What manufacturing processes are the most wasteful or damaging to the environment?
5. Are you on track with Costa Rica's goal to become carbon neutral by 2050?
6. Do you track environmental indicators?
    a. If so, can you mention some of the indicators?
    b. How does your company use this data?
7. Do you have an environmental management system?
    a. If so, is the system certified?

B.2 Final Interview Draft

1. What steps have been taken thus far to become more sustainable?
    a. What are some examples of sustainable business practices in your company?
    b. What policies/strategies are implemented to achieve sustainability?
    c. In what ways do you cut down on resource usage?

2. What are the biggest challenges your company faces in becoming more sustainable?

3. What sources of energy are used in your facility?

4. Are there any renewable fuels/biofuels used in your processes? Or are there any plans to add these fuels in the future?

5. Do you use any energy-intensive equipment?
    a. If so, what type of equipment?

6. What manufacturing processes are the most resource-intensive (water, energy, fuel...etc.)?

7. Are you on track to become carbon neutral by 2030?

8. Do you track environmental indicators and waste?
    a. If so, can you mention some of the indicators?
    b. How does your company use this data?

9. Do you have an environmental management system?
    a. If so, is the system certified?

10. Are you involved in any social or environmental projects in your community?

B.3 Spanish Translation of Final Interview Draft

Entrevista:

Breve presentación de los estudiantes y de proyecto

1. **¿Cuáles pasos ha tomado la compañía/organización para volverse más sustentable?**
    a. ¿Tiene algunos ejemplos de prácticas sustentables para negocios?
    b. ¿Tienen políticas o estrategias para volverse más sustentables ?
    c. ¿En qué maneras reducen el uso excesivo de recursos en la compañía/organización?

2. **¿Cuáles son los principales obstáculos que la compañía/organización ha enfrentado para volverse más sustentable?**

3. **¿Qué tipo de energías se usan en las facilidades de la compañía/organización?**

4. **¿Se utilizan biocombustibles o combustibles renovables actualmente en su compañía/organización? ¿Hay planes de usarlos en el futuro, cuándo?**

5. **¿Qué estrategias utiliza la compañía/organización para reducir y almacenar energía?**
    a. ¿Qué tipo ? No queda claro

6. **¿Cuál proceso dentro de su compañía/organización es el que más recursos requiere (Agua, energía, combustible...etc.)?**

7. **¿ La compañía/organización participa del programa nacional de carbono neutralidad?**
    a. ¿ Se han realizado acciones para reducir las emisiones de GEI y alcanzar la carbono neutralidad? ¿Cuáles?
    b. ¿Están en camino a volverse carbono neutral para 2030? Survey

8. **¿Su compañía/organización mide sus emisiones de carbono? Mix with 7**
    a. ¿Qué metodología utilizada para calcular las emisiones de gases de efecto invernadero?

9. **¿En la compañía/organización cuentan indicadores ambientales?**
    a. Si la respuesta es sí, ¿Cuáles?
    b. ¿Cómo se usa esta información dentro de la organización?

10. **¿Cuentan con un sistema de gestión ambiental?**
    a. ¿El sistema está certificado?
    b. ¿Tienen algún premio o reconocimiento ambiental?

Appendix C: Company Profile Template

COMPANY X: Company X

Company X is a company that… The following is a summary of their interview responses, followed by a brief table of basic data:

Sustainability Progress:

-

Carbon Neutrality Progress & Measurement:

-

Energy Reduction Strategies:

-

Sustainability Challenges:

-

Resource Intensive Processes:

-

Energy Sources and Renewable Fuels:

-

Environmental Indicators:

-

Environmental Management System:

-

Social and Environmental Projects:

-

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☐	☐	☐
Measure Carbon Emissions	☐	☐	☐
Currently Carbon Neutral	☐	☐	☐
Use Renewable Fuels or Biofuels in Processes	☐	☐	☐
Have Environmental Management System	☐	☐	☐
Have Certified Environmental Management System	☐	☐	☐
Involved in Social or Environmental Community Project	☐	☐	☐

Appendix D: Profiles of Interviewed Companies

D.1 Company A

COMPANY A: Large

This large company has over 100 employees producing various computer applications. Located in Costa Rica is the factory for producing electronic pieces. Our interview was conducted with a member of the Environmental Health and Safety Department.

Sustainability Progress:

- Mechanical
    - OFA (Oil Free Air) Compressors used to minimize oil consumption
    - Frequency Inverters used to adjust load depending on demand to reduce electrical energy consumption
    - Vacuum Pumps use frequency inverters as well
- Water Recycling
    - Recycle about 19 cubic meters of water per day
    - Net positive water results as of 2021
    - Cooling towers extend the water cycle and reduce electrical energy consumption
- Air Conditioning
    - Phased out old refrigerant in favor of R514A
    - AHU (Air Handling Unit) is chilled with water
    - Sensors in every room to detect people and turn off the air conditioning units accordingly
- Electrical
    - LED lighting
    - Solar Panels
    - ICE (Costa Rican Institute of Electricity) certified
        - 96.16% of energy is from renewable sources
- Recycling
    - Employees can bring recycling from home to on site recycling station
    - Waste stream
        - Hazardous waste storage cabinets
        - Identifying what to do with chemicals used in process

Carbon Neutrality Progress & Measurement:

- Measure carbon emissions and other indicators in excel sheet
- Already achieved carbon neutrality, but with expansion they are no longer carbon neutral
- Will return to carbon neutrality program once expansion is over

Energy Reduction Strategies:

- Lately energy consumption has been increasing due to expansion
- Once expansion is complete, they will confirm emissions and consumption of resources to re-establish a baseline to return to carbon neutrality

Sustainability Challenges:

- Funding is hard to come by
- All sustainability projects are very expensive
- Import a lot of the sustainable technology which increases cost

Resource Intensive Processes:

- Use lots of water from government and internal ground system
- Still have net positive water results

Energy Sources and Renewable Fuels:

- Hydroelectricity from rivers and solar panels provide energy
- Backup generators function with diesel, but are only used if power shuts down
- Transportation services use renewable biodiesel for buses

Environmental Indicators:

- Track many indicators in excel sheet - summarized in emission inventory
    - Waste streams
    - Hazardous waste generation
    - Energy recovery
    - LPG
    - Diesel
    - Recycling
    - Electric waste
    - Water indicators

Environmental Management System:

- Received ISO certification in September 2022

Social and Environmental Projects:

- Donate many old monitors, computers, and office supplies to schools
- A percentage of the recycled waste profit gets donated to schools
- Participate in government committees to impact the region and Costa Rica as a whole

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☑	☐	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.2 Company B

COMPANY B: Large

This large company has over 100 employees that create biofuel. They hope to create a cogeneration plant to power approximately 18,000 homes.

Sustainability Progress:

- Biogas Project: They are trying to turn the landfill waste into methanol-derived biogas that can be repurposed.

Carbon Neutrality Progress & Measurement:

- They do measure
- Their processes don't allow them to be carbon neutral

Energy Reduction Strategies:

- Solar panels
- Water treatment: Harvest rainwater and store it in tanks to repurpose its use.
- Employee education: Tik Tok and meme training (Workshops)

Sustainability Challenges:

- Costa Rican Culture: lack of sorting in the trash, lack of identification
- Company culture: getting the employees to value sustainability

Resource Intensive Processes:

- The fuel for the trucks
- The water used to clean the sorted, recycled materials

Energy Sources and Renewable Fuels:

- Solar panels
- They transform their biogas into electricity, they have the permits from the government.

Environmental Indicators:

- N/A

Environmental Management System:

- ISO 14001,1001,5001

Social and Environmental Projects:

- They take a percentage of their profits from selling recycled materials and they invest in social projects and education for the community. They work with the Universities and schools from their community to teach them more about sustainability.

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☑	☐	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.3 Company C

COMPANY C: Large

This large company has over 100 employees that provides services to companies regarding finances.

Sustainability Progress:

- Electric Vehicles: They have a project to purchase electric vehicles to reduce the use of fuels.

Carbon Neutrality Progress & Measurement:

- They are in the Carbon Neutral Plus program. (They are carbon neutral)

Energy Reduction Strategies:

- N/A

Sustainability Challenges:

- Government restrictions

Resource Intensive Processes:

- They use a lot of paper for physical transactions

Energy Sources and Renewable Fuels:

- The use ICE for their energy

Environmental Indicators:

- Energy consumption
- Water consumption
- Paper consumption
- Waste

Environmental Management System:

- ISO 14001

Social and Environmental Projects:

- They work with schools, universities, and local community centers

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☑	☐	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.4 Company D

COMPANY D: Large

This large company has over 100 employees and creates innovative and facilitating solutions to provide water and energy.

Sustainability Progress:

- Zero waste in a landfill for 2025
- Reduce water consumption by 10% for 2025
- Reduce energy consumption by 3% for 2025
- Reuse of PVC pipes in their process (50 tons)

Carbon Neutrality Progress & Measurement:

- They are applying to get in the program

Energy Reduction Strategies:

- Pegasus growth strategy

Sustainability Challenges:

- Cost
- Culture: client education regarding the reuse of materials

Resource Intensive Processes:

- Manufacturing: intensive use of water and energy for the machinery

Energy Sources and Renewable Fuels:

- 99.98% renewable energy from ICE
- Solar panels to cover 20% of the energy expenses

Environmental Indicators:

- Tons of waste generated
- Tons of waste reused
- Energy used in Kilowatts

Environmental Management System:

- ISO 14001
- ISO9001

Social and Environmental Projects:

- Pro parques: Help maintain National parks
- Federacion canina de Costa Rica: Build water dispensaries for dogs

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.5 Company E

COMPANY E: Large

This company is a large company that has over 100 employees that produce various rubber products. This interview was conducted with the Environmental Health and Safety Department members.

Sustainability Progress:

- In the process of changing boilers to use biomass
    - In 2014, they changed one of three boilers to use biomass
    - This year they are changing the next boiler to continue to reduce emissions
    - In 2 years, the last boiler will be changed
    - Eventually all fuel oil will be removed
- Work with SMEs to reuse their waste material
    - Lots of waste from the manufacturing process gets remade into other products
    - Used to send waste to landfill
    - Have now developed three to four SMEs working on developing new products
        - Window wipers
        - Wheels
        - Mallets
        - Rubber stops on chairs
        - Plungers

Carbon Neutrality Progress & Measurement:

- Main steps to reduction program:
    - Inventory everything that produces emissions
        - Calculate direct emissions from process
        - Calculate indirect emissions from transportation of product, etc.
    - Develop plan to reduce calculated emissions in production
        - Identity potential improvements in projects
        - Guide company on why it is important to offset CO2 emissions
- Currently working on reduction to approach carbon neutrality
    - Processes also have to be good for the economy of the company

Energy Reduction Strategies:

- In the process of changing boilers to use biomass, as mentioned above
- Transforming a base for biofuel and biodiesel to convert to renewable energy sources

Sustainability Challenges:

- Commitment of company to sustainability is important
    - Sustainability changes take years to make
    - Company needs to be committed to these changes so they don't get lost or ignored over time
- Legal requirements are hard to fulfill for SMEs without government support
    - Bridgestone has the funding for these changes, but spoke about challenges for SMEs
- Lots of green laws and environmental requirements
    - SMEs need additional sources to accomplish that
    - Organization needs to constantly maintain the system
        - Changes of leadership could change sustainability focus
- If small businesses are not in the export business, they may not need ISO certification

Resource Intensive Processes:

- Manufacturing uses the most resources
    - Currently identifying different sources of CO2 - specifically with emissions related to transportation and consumption (indirect emissions)

Energy Sources and Renewable Fuels:

- Main source of energy is electrical
- Other fuels used:
    - Fuel oil #6 for boilers
    - LPG
    - Biomass
    - Nitrogen
        - Used instead of water for better heat transfer to save energy

Environmental Indicators:

- Track many environmental indicators
- Three main indicators:
    - Water consumption
    - Recycling percentage
    - CO2 emissions

Environmental Management System:

- Have ISO 14001 certification
- Greenhouse Gas Certification 14064

Social and Environmental Projects:

- Annual campaign to collect old tires across the country
    - Involve local governments in campaign
    - Collect 50 tons per year
- Participate in beach cleanup programs across the country
    - Last year was the first year they involved other countries (Mexico, Colombia, Brazil)
- Free internal waste collection for all employees

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☑	☐	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.6 Company F

COMPANY F: Large

This company is a large company that has over 100 employees that work in the food industry in Central America. Devoted to sustainability and social responsibility, their mission is to create a business with responsibility and economic development.

Sustainability Progress:

- Work on three priorities:
    - Economic
    - Social
    - Environmental
- Waste solution education programs
- Activities with suppliers
    - Separate recycling and waste properly
    - Learn how to reduce electricity and fuel consumption
    - Reduce greenhouse gases in carbon neutrality program
- Energy changes:
    - LED lights
    - New cookie ovens
        - Improved burners with better maintenance
    - Improved water boiler
    - Solar panels and solar heaters

Carbon Neutrality Progress & Measurement:

- Pozuelo itself is not carbon neutral
    - Still participating in carbon neutrality program
- Has a brand, TOSH, which is carbon neutral
    - ISO certified

Energy Reduction Strategies:

- Changes to solar energy and LEDs as seen above
- Some working areas are lit with natural light

Sustainability Challenges:

- Many projects are very expensive
- ROI takes many years
    - Sustainability becomes a progress with less interest because it does not make money
- New technology has obstacles
    - Industry works in more natural gas and other fuels

- Electric ovens can be a challenge

Resource Intensive Processes:

- The ovens use both electricity and fuel

Energy Sources and Renewable Fuels:

- Electricity
- LPE

Environmental Indicators:

- They track many environmental indicators
  - Carbon emissions
  - Electricity usage
  - Water consumption
  - Waste

Environmental Management System:

- ISO 14001 certification
- Bandera Azul Ecologica certification
- TOSH is certified carbon neutral

Social and Environmental Projects:

- Working with brands to improve capacities in families
  - Improve nutrition and healthy habits

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☐	☐	☑
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.7 Company G

COMPANY G: Large

This company is a large company with over 100 employees that produce vinyl seats primarily for boats.

Sustainability Progress:

- Water reuse: tanks for rainwater that gets used for plants
- Co-Process their chemical waste
- They send all their recyclable materials to waste management companies

Carbon Neutrality Progress & Measurement:

- They are in the national program
- They are Carbon Neutral

Energy Reduction Strategies:

- They try to regulate their energy usage during the day
- Solar panels

Sustainability Challenges:

- Their local infrastructure
- Culture

Resource Intensive Processes:

- Manufacturing
- Waste disposal (Chemical waste)

Energy Sources and Renewable Fuels:

- ICE services
- Solar panel
- Bunker fuel
- Gasoil

Environmental Indicators:

- They use the ISO 14001 indicators

Environmental Management System:

- ISO14001

Social and Environmental Projects:

- They help recover parks for local communities

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☑	☐	☐
Use Renewable Fuels or Biofuels in Processes	☑	☐	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.8 Company H

COMPANY H: Large

This is a large company that has over 100 employees that are involved in a public bank.

Sustainability Progress:

- They have solar power in some of their building

Carbon Neutrality Progress & Measurement:

- They are in the national program
- They are Carbon Neutral

Energy Reduction Strategies:

- They try to regulate their energy usage by training employees

Sustainability Challenges:

- Technology
- Since they are a public entity they take longer to finish their projects because of government regulations

Resource Intensive Processes:

- Transportation

Energy Sources and Renewable Fuels:

- ICE services
- Solar panel

Environmental Indicators:

- They use the ISO 14001 indicators

Environmental Management System:

- ISO14001

Social and Environmental Projects:

- They fund projects

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☑	☐	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.9 Company I

COMPANY I: Large

This is a large company that has over 100 employees that are present in a Central and South America bank chain.

Sustainability Progress:

- They have solar power in some of their building

Carbon Neutrality Progress & Measurement:

- They are in the national program
- They are Carbon Neutral

Energy Reduction Strategies:

- They try to regulate their energy usage by training employees

Sustainability Challenges:

- Technology
- Trying to get other countries on the same page, they are present in other countries

Resource Intensive Processes:

- Transportation
- Electricity for the facilities

Energy Sources and Renewable Fuels:

- ICE services
- Solar panel

Environmental Indicators:

- They use the ISO 14001 indicators

Environmental Management System:

- ISO14001

Social and Environmental Projects:

- They fund projects

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☑	☐	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.10 Company J

COMPANY J: Medium

This is a medium-sized company that has approximately 30-99 employees that sort and compact recyclable material. These materials are exported to larger corporations and are used in their operations.

Sustainability Progress:

- Recycling service: They recycle waste from private and public institutions.
- Zero Waste: They take all the waste, sort it, and then they process it to be imported. They use 100% of the material they are given.

Carbon Neutrality Progress & Measurement:

- Once they set up the solar panels, they would be Carbon Neutral.

Energy Reduction Strategies:

- They use natural lighting in their warehouse instead of light bulbs during the day.
- Addition of Solar panels: They are working on adding solar panels to their warehouse in order to run the machinery with that energy instead of using ICE energy

Sustainability Challenges:

- Governmental institutions: they don't have the resources to sort their recycling waste properly.
- Other companies: The waste from other companies isn't sorted.
- The sorting process can be pricey and time-consuming.

Resource Intensive Processes:

- The electricity for the machines
- Fuel for the exporting vehicles

Energy Sources and Renewable Fuels:

- Electricity to power the compacting machines
- Diesel for the trucks
- Gas for the forklifts

Environmental Indicators:

- Water use
- Electricity use

- Gas use
- Diesel use
- Tons of waste

Environmental Management System:

- The company itself is a Management System since the process is recycling.
- They certify other companies based on how they dispose of their recycling waste.

Social and Environmental Projects:

- They are associated with a foundation that plants trees
- They build houses with recycled wood for the indigenous population in Costa Rica.

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.11 Company K

COMPANY K: Medium

This medium-sized company has approximately 30-9 employees that develop artificial flavors and fragrances.

Sustainability Progress:

- Natural light diffuser
- Circular economy: reuse their plastic as trash bags produced by a nearby company
- Rainwater collection and reuse for cleaning trucks
- Solar panels for energy and Solar water heaters
- Compost the organic waste

Carbon Neutrality Progress & Measurement:

- First Carbon Neutral Plus company of Costa Rica

Energy Reduction Strategies:

- Sensor activated LED lights

Sustainability Challenges:

- Company Culture: Sorting correctly

Resource Intensive Processes:

- Manufacturing (Electricity)
- Distribution (Fuel)

Energy Sources and Renewable Fuels:

- Solar energy
- Electricity
- Diesel
- LPG Gas

Environmental Indicators:

- Water Consumption
- Energy Consumption
- Fuel Consumption
- Carbon Footprint

Environmental Management System:

- They have their own management system based on the carbon neutral program

Social and Environmental Projects:

- Beach cleaning
- Tree planting

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☑	☐	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☐	☑	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.12 Company L

COMPANY L: Medium

This medium-sized company has approximately 30-99 employees designing, developing, and marketing environmental cleaning solutions.

Sustainability Progress:

- Use of biodegradable raw materials
- Make sure they all come from sustainable sources
- Work a lot with FDA and EU to make sure all raw materials are least harmful as possible
- Work with providers that get raw materials that are certified

Carbon Neutrality Progress & Measurement:

- Currently working on this
- Were in the first 7 companies, to begin with, that project
- Currently carbon neutral
    - Have been certified for more than 8 years - this is the 9th year
- Paid 20% extra to make sure they have this certification

Energy Reduction Strategies:

- Working with solar energy
- All the energy in company is based on solar energy
- More than 100 solar panels
    - Provide all the energy they need
- Still connected to local electricity network bc sometimes if they work at night they still need this energy they can't get from solar panels
- Working into buying some big industrial batteries
    - Right now the prices are expensive so they cannot afford it yet

Sustainability Challenges:

- Prices of raw materials are super expensive
    - Less common in market bc competitors used to work with more common cheaper raw materials - cheaper bc they are harmful or not biodegradable, etc.
    - Many other companies use those raw materials
    - Need to work with that difference in mind
- Customers almost always buy just based on the price
    - It's a little hard to work with this bc they have to be able to make profit too

Resource Intensive Processes:

- Biggest consumption is water
- All products are water based
- Don't have any powder product - all products are liquids
- Make sure all the water used has some kind of control to divide water fro making products and the water for human use

        - Make sure to reduce consumption of water for uses different from production
        - Selling more products means they need more water to produce more products
        - Using their own water from the well
            - They extract water from the ground
            - Have all the permissions/validations for using that water

Energy Sources and Renewable Fuels:

- Not for the transportation
    - Currently changing over vehicular fleet
    - A lot of the trucks are old
    - Trying to work with better and more efficient vehicles
    - But not working yet with renewable fuel
- In product
    - Using biodiesel
- TLDR - in products but not transportation

Environmental Indicators:

- Yes
- Measure a lot of indicators
    - Water consumption
    - Energy consumption
    - Inventory of carbon emissions
        - Greenhouse gasses
    - Use of older recyclable materials
        - Paper
        - Glass
        - Aluminum foils
    - Generation of hazardous waste from the process
        - Make sure it is treated properly

Environmental Management System:

- Certified with ISO 14001

Social and Environmental Projects:

- Have been working with a lot of institutions around community
    - Working with schools
    - Retirements homes
    - Near community
- Making sure if they need some help with repair of streets/education/scholarships for employees then they get it

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

D.13 Company M

COMPANY M: Small

This small company has approximately 10-29 employees that sell composters. This company offers training and educational courses on how to compost properly.

Sustainability Progress:

- Their composters are made with recyclable materials
- They offer composting education
- They are trying to produce their composters with recycled plastic.

Carbon Neutrality Progress & Measurement:

- They are not in the national program. It is expensive

Energy Reduction Strategies:

- Regular energy saving practices
- Educate employees

Sustainability Challenges:

- Economic power
- Company capacity (15 employees currently)
- Access to technology and certifications

Resource Intensive Processes:

- Transporting the composters (they import them)

Energy Sources and Renewable Fuels:

- ICE services
- Diesel for cars and trucks

Environmental Indicators:

- Electricity
- Water
- Waste
- Carbon emissions

Environmental Management System:

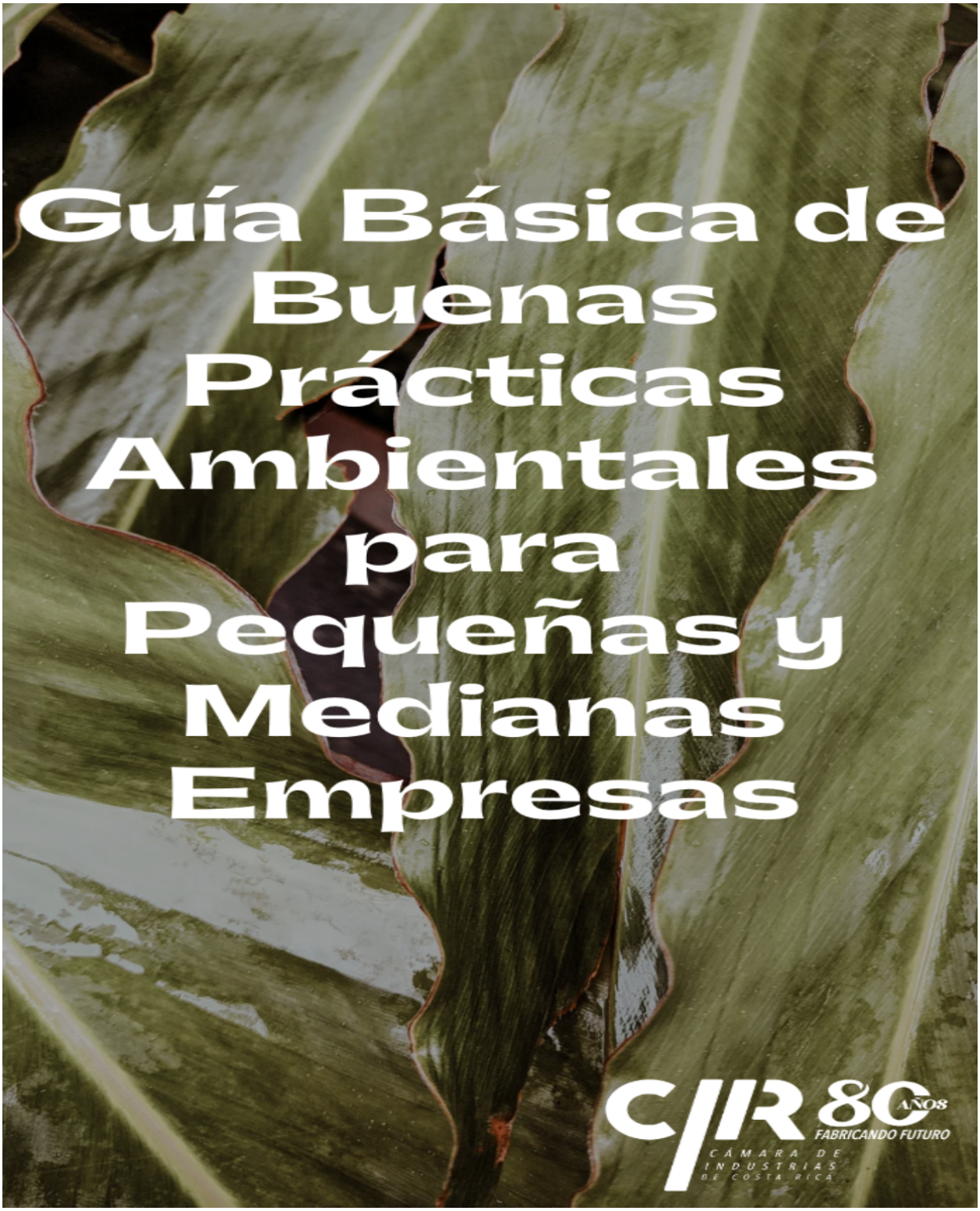
- Bandera Azul ecologica

Social and Environmental Projects:

- They help local communities with free composting education

Does the company…? / Is the company…?	Yes	No	Unsure
Track Environmental Indicators	☑	☐	☐
Measure Carbon Emissions	☑	☐	☐
Currently Carbon Neutral	☐	☑	☐
Use Renewable Fuels or Biofuels in Processes	☐	☑	☐
Have Environmental Management System	☑	☐	☐
Have Certified Environmental Management System	☑	☐	☐
Involved in Social or Environmental Community Project	☑	☐	☐

Appendix E. Spanish Translation of the Guide



Prácticas Sostenibles para PYMEs

Es importante entender el impacto que pueden tener las empresas en el impacto ambiental y el cambio climático.

Es importante entender cómo las compañías pueden tener un impacto tanto positivo como negativo en el medioambiente . Hacer la transición a prácticas más sustentables ayudará a que la empresa sea más ecológica , lo que puede mejorar el mercadeo de la compañía. La sostenibilidad es un activo comercializable para las empresas ya que los consumidores prefieren productos ecológicos con bajo impacto para el ambiente.

Esta guía fue creada con la ayuda de un grupo de estudiantes de la universidad de Worcester Polytechnic Institute después de un estudio centrado en sostenibilidad empresarial de Costa Rican realizado en Febrero de 2023; el estudio se enfoca en siete áreas en las cuales las compañías pueden volverse más sustentables, y fue creado a base de los resultados de entrevistas y cuestionarios dirigidos a diferentes companies en Costa Rica. Estas recomendaciones le ayudarán a su empresa a tener un impacto positivo en el ambiente sin arriesgar la economía de la empresa.

Además, nos gustaría agradecerle a las 13 compañías que entrevistamos por su tiempo y por facilitarnos la información necesaria para crear esta guía.

Presentado por:
Jack Cassidy
Julia Dowd
Katie Sirowich
Francisco Yanes

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Tabla de contenidos

LOGÍSTICAS Y OPERACIONES

Entender la logística de las prácticas actuales de la compañía es el primer paso de la transición a prácticas más sustentables.

Antes de empezar la transición, es importante realizar un análisis de la situación actual de la compañía. Es importante tener un buen entendimiento de los pasos que se pueden tomar sin pasarse del presupuesto disponible . Los siguientes son los pasos recomendados para hacer la transición a prácticas más sostenibles:

Figura 1: Diagrama de triple utilidad

Análisis Financiero

Hacer una evaluación financiera es necesario para poder definir si la compañía tiene el nivel económico para hacer la inversión inicial que conlleva la sostenibilidad. El primer paso es identificar los ingresos de la compañía y los gastos para evitar usar más de lo que se tiene. Si bien el costo inicial puede ser elevado, las prácticas sostenibles ayudan a ahorrar gastos por lo que cubren esa inversión inicial eventualmente. La rentabilidad de la inversión suele extenderse por un largo tiempo , sin embargo en Costa Rica se están empezando a implementar más políticas y metas de Carbono Neutralidad , y ya el negocio estaría mejor preparado para la transición.

Evaluación Interna del Uso de Recursos Naturales

Una evolución interna del uso total de recursos naturales en la empresa puede ayudar a identificar los siguientes pasos que se deben tomar para minimizar la huella de carbono y el impacto en el ambiente. Un ejemplo de cosas que se evaluarán es la emisión de carbono de los procesos involucrados en la producción de productos vendidos en la compañía.

Entrenamiento del Empleado

Educar al empleado es crucial para promover el conocimiento acerca de las prácticas sostenibles en la compañía. La preparación de los empleados puede ser realizada internamente con el departamento de recursos humanos de la compañía o se puede contratar a una organización externa que se especialice en buenas prácticas ambientales.

Unificación de la Cultura Empresarial

Para construir una cultura de sostenibilidad en la compañía se necesita integrar la sostenibilidad en las decisiones del día a día. Si se quiere promover esta cultura empresarial la compañía puede recompensar las iniciativas y acciones de los empleados . Para motivar al empleado se puede crear una lista de objetivos sustentables, esto puede ayudar a motivar a los empleados. Por último para poder promover sostenibilidad en la compañía se tiene que recompensar al empleado que lo hace bien, ya sea un bono o algún tipo de premio por su trabajo.

Triple Utilidad

La triple utilidad sirve para medir el impacto social, ambiental y económico de la compañía. Esto puede ser realizado mediante entrevistas y cuestionarios para el impacto social, evaluaciones financieras para el impacto económico, y la medición de las emisiones de carbono e indicadores ambientales. Los resultados pueden ser usados para tomar decisiones informadas en el área de operaciones sostenibles, también se puede usar para evaluar el rendimiento de las prácticas sostenibles implementadas

INDICADORES AMBIENTALES

El primer paso para volverse más sustentable es medir indicadores ambientales.

Después de completar la evaluación de la compañía el siguiente paso es implementar un sistema para medir el impacto ambiental de la compañía. Esto puede ser hecho en una hoja de cálculo que representa los indicadores ambientales. Esta parte de la guía hablará sobre los cuatro indicadores ambientales más comunes; el sistema no se limita en estos cuatro indicadores, sin embargo son los recomendados para compañías que están empezando. A continuacion estan enumerados los principales indicadores ambientales que lo ayudarán a medir el impacto ambiental de su empresa:

Consumo Electrico

Cualquier método utilizado para reducir la cantidad de energía total en la empresa puede calificarse como recuperación de energía. Para tener seguimiento del consumo interno de energía se puede contactar a su proveedor de energía y analizar la cantidad de energía que se usa en la compañía. Es importante analizar las diferentes maneras en las que se puede minimizar el consumo eléctrico. Como objetivo a largo plazo se debería analizar y comparar el consumo eléctrico anual y así poder medir la mejora en el consumo. Las empresas también pueden medir sus propios indicadores eléctricos, con las unidades de kW/h.

Consumo de Agua

Al igual que el consumo eléctrico el consumo de agua se le puede hacer seguimiento contactando al proveedor y analizando el consumo de la empresa. Reducir el consumo innecesario de agua puede ayudar a mejorar el impacto ambiental. Las empresas pueden medir qué procesos individuales son los más derrochadores de aguas y así poder buscar soluciones para compensar el desperdicio. Para este indicador se utilizarían las unidades de Kg por producto final o litro por unidad de desecho.

Cantidad de Desecho

La recuperación de productos desechados es un proceso clave para la mejora del impacto ambiental de empresas. La disposición adecuada de productos químicos y el almacenamiento seguro de materiales peligrosos son clave para minimizar el daño al ambiente. Es importante llevar el seguimiento de las cantidades de residuos generados, las unidades adecuadas para este indicador serían Kg de residuo por unidad, ó Kg de residuo por producto final.

Porcentaje de Reciclaje

El reciclaje es una parte crucial del desarrollo de un negocio sostenible. Separar los diferentes tipos de desechos puede ayudar a la empresa a llevar la cuenta de la cantidad de desecho que es reciclado. Se puede utilizar la siguiente fórmula para calcular el porcentaje de reciclaje de la compañía.

$$\frac{Cantidad\ de\ reciclaje\ mensual}{Cantidad\ de\ residuos\ sólidos\ mensual} = Porcentaje\ de\ reciclaje$$

ELECTRICIDAD

La gestión eficaz del uso de la electricidad puede ayudar a reducir el costo anual de las operaciones.

Para reducir el costo anual del uso de electricidad se puede incorporar el uso de tecnologías capaces de reducir el consumo de electricidad o que generen electricidad internamente para compensar el uso y reducir el costo. Las siguientes son ideas de bajo costo que pueden ayudar a reducir el consumo energético de la empresa:

Difusores de Luz Natural

Instalar difusores de luz natural en el techo del espacio de trabajo puede puede ayudar a reducir el consumo eléctrico durante el día ya que se hace uso de luz solar. Sin embargo, debe combinarse con un sistema de luz eléctrica ya que la luz solar no puede abastecer todo el día.

Luces LED

Cambiar sus bombillas tradicionales por LED puede ayudar a reducir los costos eléctricos, ya que las LED son energéticamente más eficientes y suelen tener una vida útil más larga.

Sensores de Movimiento

Los sensores de movimiento son una herramienta útil en cualquier espacio de trabajo para regular el consumo eléctrico, los sensores apagan los dispositivos si no se detecta movimiento en el sector. Se puede usar en luces y en unidades de aire acondicionado para reducir el uso innecesario de los dispositivos.

Figura 2: Ejemplo de un sistema de paneles solares

Paneles Solares

El uso de paneles solares puede reducir el costo eléctrico interno de la compañía. Un sistema básico de paneles solares en Costa Rica puede costar entre $7000 y $8000. Sin embargo, la reducción del costo eléctrico ayuda a cubrir la inversión inicial para el sistema de paneles solares. Dependiendo del tamaño del sistema, es posible ahorrar desde el 30% hasta un 95% en las facturas de electricidad.

Calentadores de Agua Solar

Un calentador de agua solar puede elevar la temperatura del agua antes de ser usada para procesos. Estos calentadores pueden reducir la carga total de las calderas para llevar el al agua a su punto de ebullición y así se reduce el consumo energético de la empresa.

AGUA

La conservación del agua en las empresas puede reducir los costos, el impacto ambiental y demuestra la responsabilidad social de la empresa .

El agua es un recurso vital que se utiliza en diferentes procesos y operaciones dentro de una empresa. El uso de los sistemas de agua que se mencionan a continuación puede ayudar a la empresa. La siguiente sección habla sobre diferentes sistemas e ideas para aumentar la conservación del agua :

Electrodomésticos Eficientes

Hay muchos electrodomésticos en el mercado que ayudan con el ahorro de agua, algunas opciones económicas son los inodoro, urinarios y grifos de bajo flujo. A mayor escala, las empresas pueden invertir en equipos más avanzados como calderas de alta eficiencia y torres de enfriamiento. Si es factible las empresas también pueden invertir en cambiar las válvulas existentes por válvulas de bajo flujo.

Figura 3: Sistema de recolección de agua de lluvia

Métodos de Recolección de Agua

Son una medida efectiva para recolectar y conservar agua. Un ejemplo es la recolección del agua de lluvia de los techos a través de un sistema que usa la gravedad y guarda el agua en un tanque externo. Otro ejemplo es hacer uso de la condensación de las unidades de aire acondicionado y usar esa agua para regar plantas a través de un sistema simple de tuberías de PVC. Esta agua recolectada puede ser reutilizada con usos no potables como paisajismo, limpieza y procesos industriales.

Mantenimiento de los Sistemas de Agua

Los sistemas bien mantenidos funcionan de manera más eficiente, usando menos agua y energía para brindar el mismo nivel de servicio. Las empresas tienen que hacer evaluaciones periódicas de sus sistemas de agua para asegurarse que están a un nivel aceptable y así prevenir el desperdicio de agua por equipos defectuosos. También se puede implementar un programa de detección y reparación de fugas.

DESECHO

Las empresas siempre producen algún tipo de residuo; gestionarlo adecuadamente es necesario para ser más sustentable.

Toda empresa debe centrarse en intentar reducir residuos. Además, los residuos deben ser reusados o dispuestos de manera adecuada. Los siguientes son métodos para disponer o reutilizar los residuos de manera:

Gestión de Residuos Peligroso

Para disponer de residuos peligrosos, lo primero que se debe hacer es identificar qué tipo de residuo se está tratando, el siguiente paso es contactar a una compañía que esté certificada en la gestión de este tipo de residuo. La siguiente es una lista de los tipos de residuos peligrosos en Costa Rica :

- *Baterias*
- *Aceites y lubricantes usados*
- *Refrigerantes*
- *Artefacto eléctricos*
- *Artefactos medicos*
- *Residuo químico (inflamatorio, corrosivo, oxidante)*
- *Bombillos fluorescentes y compactos*

Figura 4: Ejemplo de un sistema de separación de desechos

Centro de Reciclaje

Toda empresa debe intentar reciclar la mayor cantidad de desecho posible. Las empresas pueden enviar sus desechos reciclables (plástico, vidrio, cartón y papel) a compañías especializadas en gestión de residuos quienes se encargan de procesar y reciclar los materiales, o puede intentar reutilizar estos materiales en su propio proceso. Si la empresa decide reciclar sus propios desechos es importante contar con un protocolo y un centro de reciclaje eficiente. Los desechos deben ser lavados y separados adecuadamente antes de empezar el proceso de reutilización o venta de los mismos.

Compostaje

Es un proceso fácil y económico que las PYMEs pueden pueden incorporar en sus prácticas sostenibles. Mediante el compostaje las empresas reutilizan sus desechos orgánicos en forma de abono orgánico para crecer vegetales y alimentos. Este abono también puede ser donado a agricultores o familias de la comunidad. Una compostera mediana que contenga 35 kilos de desecho orgánico cuesta entre $700 y $800 en el mercado costarricense, una opción más pequeña puede costar unos $200. Es importante seguir el proceso de compostaje al pie de la letra para evitar problemas como malos olores.

IMPACTO SOCIAL

El aspecto social de la sustentabilidad suele ser olvidado, pero es necesario un ambiente laboral más sano y una mejor conexión con la comunidad.

Como dueños de negocios y empleados es importante relacionarse con la comunidad que los rodea. Los proyectos sociales son necesarios para mantener una relación sana con la comunidad e impactar positivamente el medio ambiente. Las siguientes son ideas económicas para tener interacciones positivas con el público:

Crear un Ambiente Sano para los Empleados

Para tener un impacto social positivo, es necesario que todo esté bajo control internamente. Es necesario asegurarse de que los empleados tengan un ambiente de trabajo saludable donde sean tratados con respeto.

Donar Equipos Viejos a Escuelas, Librerías u Otras Organizaciones Públicas

Las computadoras viejas, los monitores y otros suministros de oficina no necesitan desecharse. En su lugar, pueden ser donados a otras personas que los necesiten.

Trabajar con Escuelas y Universidades Locales

Ofrecer tours a los estudiantes para que puedan aprender sobre lo que se hace en la empresa. Realizar charlas o talleres con el fin de educar a las futuras generaciones.

Voluntariado en Campañas de Limpieza Ambiental

Lidera o participa en campañas de limpieza ambiental.

IMPACTO AMBIENTAL

Toda empresa impacta el medio ambiente, al volverse más sustentable se reduce ese impacto, lo que beneficia al medio ambiente.

El impacto ambiental se puede dividir en dos tipos, el impacto directo y el impacto indirecto. El directo es el resultado de los procesos que se realizan dentro de la compañía, y el indirecto proviene de las compañías con las que se trabaja, ya sean proveedores o compradores. El impacto de una compañía se mide desde el inicio hasta el final de la vida útil de sus productos.

Credito de Carbono

La compensación de carbono es un proceso en el cual las empresas invierten en proyectos o iniciativas que benefician al medio ambiente, por lo cual esta inversión compensa por las emisiones de carbono de la empresa. Esto no significa que al adquirir el crédito de carbón las emisiones netas de la empresa se reduzcan, sino que el crédito sirve para compensar por esas emisiones. El programa UCC-FONAFIFO gestiona compensaciones de carbono y proporciona recursos para reducir esa huella de carbono.

Certificaciones Ambientales

Las certificaciones ambientales dictan una pauta a seguir para las empresas que se certifican, esta guía puede facilitar el proceso de establecer un sistema de gestión ambiental. Las certificaciones más comunes en Costa Rica son la ISO 14001, la certificación de Carbono Neutral, y la Bandera Azul Ecológica. Es común que las empresas contraten a un consultor especializado para que los ayude a dar los pasos necesarios para obtener la certificación. El uso de un consultor también puede reducir el tiempo que toma obtener la certificación, que a menudo puede tomar entre seis a doce meses, dependiendo de la estructura actual de sostenibilidad de la compañía.

Abastecimiento Ético en Cadenas de Suministros Sostenibles

El abastecimiento de materiales en una compañía forma parte del impacto ambiental indirecto de las mismas. El abastecimiento ético requiere que las empresas se aseguren de que los productos y la materia prima que compran sean fabricados o extraídos por proveedores que cumplen con los estándares ambientales y éticos. Estas cadenas de suministros buscan reducir el impacto ambiental durante la vida útil del producto, que incluye la producción, el transporte y la disposición del mismo.

Referencias

Figura 1: Diagrama de triple utilidad

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Figura 2: Ejemplo de un sistema de paneles solares

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Figura 3: Sistema de recolección de agua de lluvia *Sistema de captación de agua de lluvia para usar como agua potable*. (2022, octubre 9). https://ecoinventos.com/sistema-de-captacion-de-agua-de-lluvia-para-usar-como-agua-potable/

Figura 4: Ejemplo de un sistema de separación de desechos Aconcagua, I. (s/f). *Súmate al estilo de vivir en un Punto Limpio—Inmobiliaria Aconcagua*. Súmate al estilo de vivir en un Punto Limpio - Inmobiliaria Aconcagua. Recuperado el 1 de marzo de 2023, de https://www.iaconcagua.com/articulos/puntos-limpios

Appendix F. Powerpoint Configuration of the Guide

F.1 Powerpoint in English

A Basic Guide of Sustainability Practices Small & Medium Enterprises

1

Acknowledgments

Our team would like to thank the 13 interviewees who took time out of their days to educate us and answer our interview questions. We would also like to thank the 50 survey responders for their transparency and willingness to complete our survey. Listed below are our advisors and sponsors who have greatly aided us with this project.

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Andrei Gaggion
Cámara de Industrias de Costa Rica

Submitted by: Jack Cassidy, Julia Dowd, Katie Sirowich, Francisco Yanes

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01

LOGISTICS & OPERATIONS

Understanding the logistics and operations of current business practices is a fundamental first step in the transition to sustainability.

LOGISTICS & OPERATIONS

Understanding the logistics and operations of current business practices is a fundamental first step in the transition to sustainability.

- **Analyze financial situation**
  - *It's crucial to get an economic and financial assessment to see if a company is profitable enough to undertake the initial investment into sustainable practices (Figure 1)*
- **Internal assessment of resource usage**
  - *This can range from tracking carbon emissions of each individual product to looking at what current activities are being done to avoid or reduce waste.*
- **Employee education**
  - *Train employees internally on sustainable practices or seek outside training by qualified groups*
- **Unified company culture**
  - *Break down habits into small milestones so employees get a sense of accomplishment which could lead to greater motivation. Reward sustainability in your company.*
- **Triple bottom line**
  - *This can be done by conducting surveys and interviews to measure social impacts, evaluating financial statements and tracking carbon emissions or product life cycle assessments.*

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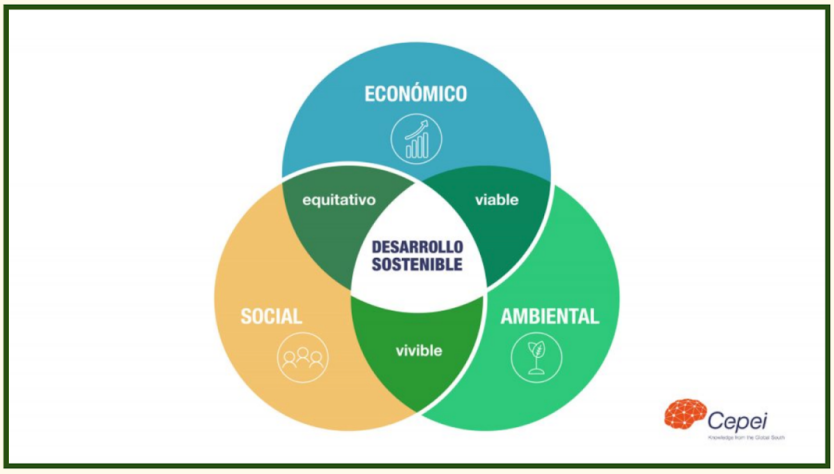

Figure 1: The three different sections within analyzing the business. All three sections are relevant to ensure the success of your company

6

02

ENVIRONMENTAL INDICATORS

The first step in becoming more sustainable is to measure your environmental impact.

7

ENVIRONMENTAL INDICATORS

The first step in becoming more sustainable is to measure your environmental impact.

- **Energy recovery**
  - *To track energy usage within the company, examine the energy usage report through your company's supplier and discuss possible ways to minimize single-use energies. As a long term goal, implement a yearly impact assessment in comparing these usage reports across all varieties of used energies.*
- **Water consumption**
  - *Tracking water consumption can be seen through water usage statements provided by the supplier to eliminate areas that use excessive water. Identifying potential areas where water consumption is unnecessary or can be reduced will significantly impact the total water waste.*
- **Waste products**
  - *Properly disposing of chemicals and storing hazardous materials safely makes the potential for dangerous waste slim.*
- **Recycling percentage**
  - Separate different items that can be recycled will aid your company in tracking recycling progress.

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03

ELECTRICITY

Managing electricity use effectively can help reduce the yearly cost of operations

9

ELECTRICITY

Managing electricity use effectively can help reduce the yearly cost of operations

- **Natural light diffusers**
  - *Installing skylight diffusers in the ceiling of the workspace can help reduce electricity consumption during the day by utilizing natural sunlight. (Figure 2)*
- **LED lights**
  - *Changing your traditional light bulbs for LEDs can help reduce electric costs since LEDs are more energy effective and last longer. (Figure 4)*
- **Motion sensor technology**
  - *Motion sensor devices can be a useful tool in any workspace to regulate electricity consumption by turning devices off when activity in a room is not detected. They can be used for lights and AC units to reduce unnecessary usage.*
- **Solar panels**
  - *Solar panels can help you save money on electricity internally. Depending on your system's size, it is possible to save from 30% up to 95% in electricity bills using solar panels.* (Figure 3)
- **Solar water heaters**
  - *A solar water heater can raise the initial temperature of the water before being used in manufacturing. These heaters put less load on a boiler, drawing less energy to get to the boiling point or necessary temperature for production.*

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Figure 2:Natural Light Diffuser

Figure 3: Solar Panels Installed on a roof

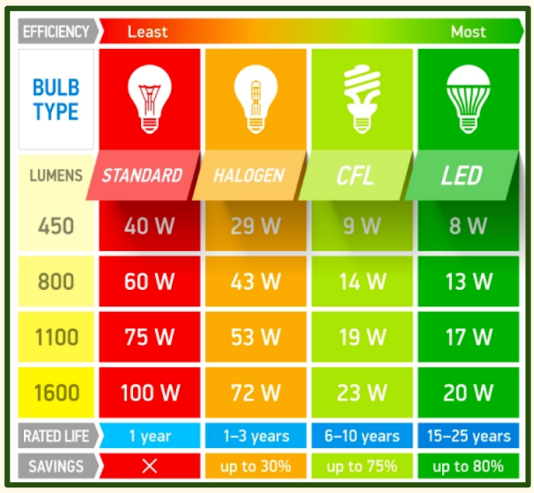

Figure 4:The comparison of Incandescent, Compact fluorescent lights , and LED. LED is a long term investment with a quick Return on Investment

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04

WATER

Water conservation in businesses can lower costs, reduce environmental impact, and demonstrate corporate social responsibility.

12

WATER

Water conservation in businesses can lower costs, reduce environmental impact, and demonstrate corporate social responsibility.

- **Water efficient appliances**
  - *There are many water-efficient fixtures and appliances on the market currently, with inexpensive options such as low-flow toilets, urinals, and faucet aerators. On a larger scale, businesses can invest in water-efficient equipment like high-efficiency boilers and cooling towers.*
- **Water collection methods**
  - *You can harvest rainwater from the roof through a gravity-fed system into a supply tank. Capture excess water that is produced by air conditioning units or dehumidifiers. Businesses can use this recycled or reclaimed water for non-potable purposes such as landscaping, cleaning, and other industrial processes.(Figure 5)*
- **Water system upkeep**
  - *Well-maintained systems operate more efficiently, using less water and energy to deliver the same level of service. Companies should conduct regular system checks to ensure water is not wasted by faulty equipment. Another option is to implement a leak detection and repair program.*

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Figure 5: This tank is a rainwater collection system. It can be used in different manufacturing processes.

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05

WASTE

Companies will always produce some form of waste; by properly managing as much waste as possible, your company will become more sustainable.

15

WASTE

Companies will always produce some form of waste; by properly managing as much waste as possible, your company will become more sustainable.

- **Hazardous waste disposal**
  - *In order to dispose of hazardous waste, you must identify the type of hazardous waste that is being produced. Next, you must contact a waste management company to properly dispose of the hazardous materials. The following is a short list of types of hazardous waste:*
    - *Batteries*
    - *Used oils & lubricants*
    - *Refrigerants*
    - *Home appliances*
    - *Medical appliances*
    - *Chemical waste*
- **Recyciing center**
  - *A company can either send their recyclable waste to a waste management company that will process and recycle the waste, or they can reuse their waste in their processes. If a company recycles its own waste, it is key to have a recycling center or protocol in place. The waste needs to be sorted and cleaned before it is reused or repurposed. (Figure 6)*
- **Composting**
  - *Composting is an easy and cost-effective process that SMEs can use in their sustainability processes. By composting, companies can repurpose their organic waste into compost that can be used by the employees or donated to local farmers and families*

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Figure 6 : An example of how all recycled products can be sorted into different categories.

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SOCIAL IMPACT

The social aspect of sustainability is often neglected but is necessary for a healthy work environment.

SOCIAL IMPACT

The social aspect of sustainability is often neglected but is necessary for a healthy work environment.

- **Develop a healthy working environment for employees**
  - *To have a positive social impact on the community outside the business, you must ensure that things are running smoothly internally. Make sure your employees have a healthy and happy working environment where they are treated with respect.*
- **Donate old equipment to schools, libraries, or other public organizations**
  - *Old computers, monitors, and other office supplies don't need to be thrown away. They can instead be donated to others who need them.*
- **Work with schools, universities, and local education providers**
  - *Offer to give tours of your facility to students or to speak to students on-site to engage with the community and education in the area.*
- **Volunteer for or organize environmental cleanup campaigns**
  - *Lead or participate in efforts to clean trash from beaches, forests, and city streets.*

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07

ENVIRONMENTAL IMPACT

Every company has an impact on the environment, and by becoming sustainable your company can positively aid the environment.

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ENVIRONMENTAL IMPACT

Every company has an impact on the environment, and by becoming sustainable your company can positively aid the environment.

- **Carbon offset**
  - *Carbon offsetting is a process in which companies invest in initiatives that can compensate for their own carbon emissions. The UCC-FONAFIFO program by FONAFIFO manages carbon offsetting, and provides resources to reduce carbon footprints.*
- **Environmental certifications**
  - *Environmental certifications dictate a guideline for companies to follow that can facilitate the process of setting up an environmental management system. Some of the most common certifications in Costa Rica are the ISO 14001, the Certificacion Carbono Neutral, the Bandera Azul Ecológica and INTECO. Hiring a consultant can also reduce the time to get the certification, which can often be from six months to a year depending on the company's current sustainability structure.*
- **Ethical sourcing from sustainable supply chains**
  - *Ethical sourcing requires businesses to ensure that products and raw materials are made by suppliers who adhere to environmental and social standards, such as fair labor practices and responsible resource management. These supply chains seek to minimize environmental impact during the entire lifespan of a product: Production, transportation and disposal.*

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Thank you.

Gracias por su tiempo.

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F.2 Powerpoint in Spanish

Prácticas sostenibles para pequeñas y medianas empresas

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Reconocimientos

Esta guía fue creada con la ayuda de un grupo de estudiantes de la universidad de Worcester Polytechnic Institute después de un estudio centrado en sostenibilidad empresarial de Costa Rican realizado en Febrero de 2023; el estudio se enfoca en siete áreas en las cuales las compañías pueden volverse más sustentables, y fue creado a base de los resultados de entrevistas y cuestionarios dirigidos a diferentes companies en Costa Rica. Estas recomendaciones le ayudarán a su empresa a tener un impacto positivo en el ambiente sin arriesgar la economía de la empresa.

Además, nos gustaría agradecerle a las 13 compañías que entrevistamos por su tiempo y por facilitarnos la información necesaria para crear esta guía.

Akira Hidalgo Segura
Andrei Gaggion
Cámara de Industrias de Costa Rica

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01

LOGÍSTICA Y OPERACIONES

Entender la logística de las prácticas actuales de la compañía es el primer paso de la transición a prácticas más sustentables.

LOGÍSTICA Y OPERACIONES

Entender la logística de las prácticas actuales de la compañía es el primer paso de la transición a prácticas más sustentables

- **Analisis financiero**
  - *Hacer una evaluación financiera es necesario para poder definir si la compañía tiene el nivel económico para hacer la inversión inicial que conlleva la sostenibilidad (Figure 1)*
- **Evaluación interna del uso de recursos naturales**
  - *Una evaluación interna del uso total de recursos naturales en la empresa puede ayudar a identificar los siguientes pasos que se deben tomar para minimizar la huella de carbono y el impacto en el ambiente.*
- **Entrenamiento del empleado**
  - *La preparación de los empleados puede ser realizada internamente con el departamento de recursos humanos de la compañía o se puede contratar a una organización externa que se especialice en buenas prácticas ambientales.*
- **Unificación de la cultura empresarial**
  - *Si se quiere promover esta cultura empresarial la compañía puede recompensar las iniciativas y acciones de los empleados .*
- **Triple utilidad**
  - *Esto puede ser realizado mediante entrevistas y cuestionarios para el impacto social, evaluaciones financieras para el impacto económico, y la medición de las emisiones de carbono e indicadores ambientales*

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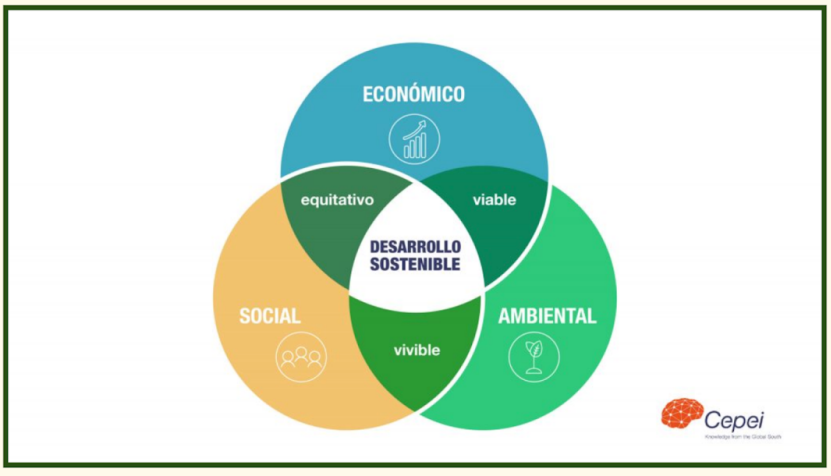

Figura 1: Diagrama de triple utilidad

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02

INDICADORES AMBIENTALES

El primer paso para volverse más sustentable es medir indicadores ambientales.

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INDICADORES AMBIENTALES

El primer paso para volverte más sustentable es medir tu impacto ambiental.

- **Consumo electrico**
  - *Para tener seguimiento del consumo interno de energía se puede contactar a su proveedor de energía y analizar la cantidad de energía que se usa en la compañía. Es importante analizar las diferentes maneras en las que se puede minimizar el consumo eléctrico.*
- **Consumo de agua**
  - *Reducir el consumo innecesario de agua puede ayudar a mejorar el impacto ambiental. Las empresas pueden medir qué procesos individuales son los más derrochadores de aguas y así poder buscar soluciones para compensar el desperdicio.*
- **Cantidad de desechos**
  - *La disposición adecuada de productos químicos y el almacenamiento seguro de materiales peligrosos son clave para minimizar el daño al ambiente. Es importante llevar el seguimiento de las cantidades de residuos generados, las unidades adecuadas para este indicador serían Kg de residuo por unidad, ó Kg de residuo por producto final.*
- **Porcentaje de reciclaje**
  - Separar los diferentes tipos de desechos puede ayudar a la empresa a llevar la cuenta de la cantidad de desecho que es reciclado..

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03

ELECTRICIDAD

La gestión eficaz del uso de la electricidad puede ayudar a reducir el costo anual de las operaciones.

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ELECTRICIDAD

La gestión eficaz del uso de la electricidad puede ayudar a reducir el costo anual de las operaciones.

- **Difusores de Luz Natural**
  - *Instalar difusores de luz natural en el techo del espacio de trabajo puede puede ayudar a reducir el consumo eléctrico durante el día ya que se hace uso de luz solar. (Figura 2)*
- **Luces LED**
  - *Cambiar sus bombillas tradicionales por LED puede ayudar a reducir los costos eléctricos, ya que las LED son energéticamente más eficientes y suelen tener una vida útil más larga. (Figura 4)*
- **Sensores de Movimiento**
  - *Los sensores de movimiento son una herramienta útil en cualquier espacio de trabajo para regular el consumo eléctrico, los sensores apagan los dispositivos si no se detecta movimiento en el sector.*
- **Paneles Solares**
  - *El uso de paneles solares puede reducir el costo eléctrico interno de la compañía. Un sistema básico de paneles solares en Costa Rica puede costar entre $7000 y $8000. Sin embargo, la reducción del costo eléctrico ayuda a cubrir la inversión inicial para el sistema de paneles solares.*(Figura 3)
- **Calentadores de Agua Solar**
  - *Un calentador de agua solar puede elevar la temperatura del agua antes de ser usada para procesos.*

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Figure 2:Difusor de luz natural

Figura 3: Ejemplo de un sistema de paneles solares

EFFICIENCY	Least			Most
BULB TYPE				
LUMENS	STANDARD	HALOGEN	CFL	LED
450	40 W	29 W	9 W	8 W
800	60 W	43 W	14 W	13 W
1100	75 W	53 W	19 W	17 W
1600	100 W	72 W	23 W	20 W
RATED LIFE	1 year	1–3 years	6–10 years	15–25 years
SAVINGS	✕	up to 30%	up to 75%	up to 80%

Figura 4:Comparación entre diferentes tipos de bombillos, la LED es la mejor opción a largo plazo

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04

AGUA

La conservación del agua en las empresas puede reducir los costos, el impacto ambiental y demuestra la responsabilidad social de la empresa .

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AGUA

La conservación del agua en las empresas puede reducir los costos, el impacto ambiental y demuestra la responsabilidad social de la empresa .

- **Electrodomésticos Eficientes**
  - *Hay muchos electrodomésticos en el mercado que ayudan con el ahorro de agua, algunas opciones económicas son los inodoro, urinarios y grifos de bajo flujo. A mayor escala, las empresas pueden invertir en equipos más avanzados como calderas de alta eficiencia y torres de enfriamiento.*
- **Métodos de Recolección de Agua**
  - *Son una medida efectiva para recolectar y conservar agua. Un ejemplo es la recolección del agua de lluvia de los techos a través de un sistema que usa la gravedad y guarda el agua en un tanque externo.(Figure 5)*
- **Mantenimiento de los Sistemas de Agua**
  - *Los sistemas bien mantenidos funcionan de manera más eficiente, usando menos agua y energía para brindar el mismo nivel de servicio. Las empresas tienen que hacer evaluaciones periódicas de sus sistemas de agua para asegurarse que están a un nivel aceptable y así prevenir el desperdicio de agua por equipos defectuosos. También se puede implementar un programa de detección y reparación de fugas.*

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Figura 3: Sistema de recolección de agua de lluvia

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DESECHO

Las empresas siempre producen algún tipo de residuo; gestionarlo adecuadamente es necesario para ser más sustentable.

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DESECHO

Las empresas siempre producen algún tipo de residuo; gestionarlo adecuadamente es necesario para ser más sustentable.

- **Gestión de Residuos Peligroso**
  - *Para disponer de residuos peligrosos, lo primero que se debe hacer es identificar qué tipo de residuo se está tratando, el siguiente paso es contactar a una compañía que esté certificada en la gestión de este tipo de residuo. La siguiente es una lista de los tipos de residuos peligrosos en Costa Rica :*
    - *Baterias*
    - *Aceites y lubricantes usados*
    - *Refrigerantes*
    - *Artefactos eléctricos*
    - *Artefactos medicos*
    - *Residuo quimico*
- **Centro de Reciclaje**
  - *Si la empresa decide reciclar sus propios desechos es importante contar con un protocolo y un centro de reciclaje eficiente. Los desechos deben ser lavados y separados adecuadamente antes de empezar el proceso de reutilización o venta de los mismos. (Figure 6)*
- **Compostaje**
  - *Es un proceso fácil y económico que las PYMEs pueden pueden incorporar en sus prácticas sostenibles. Mediante el compostaje las empresas reutilizan sus desechos orgánicos en forma de abono orgánico para crecer vegetales y alimentos. Este abono también puede ser donado a agricultores o familias de la comunidad.*

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Figura 4: Ejemplo de un sistema de separación de desechos

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06

IMPACTO SOCIAL

El aspecto social de la sustentabilidad suele ser olvidado, pero es necesario un ambiente laboral más sano y una mejor conexión con la comunidad.

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IMPACTO SOCIAL

El aspecto social de la sustentabilidad suele ser olvidado, pero es necesario un ambiente laboral más sano y una mejor conexión con la comunidad.

- **Crear un Ambiente Sano para los Empleados**
  - *Para tener un impacto social positivo, es necesario que todo esté bajo control internamente. Es necesario asegurarse de que los empleados tengan un ambiente de trabajo saludable donde sean tratados con respeto.*
- **Donar Equipos Viejos a Escuelas, Librerías u Otras Organizaciones Públicas**
  - *Las computadoras viejas, los monitores y otros suministros de oficina no necesitan desecharse. En su lugar, pueden ser donados a otras personas que los necesiten.*
- **Trabajar con Escuelas y Universidades Locales**
  - *Ofrecer tours a los estudiantes para que puedan aprender sobre lo que se hace en la empresa. Realizar charlas o talleres con el fin de educar a las futuras generaciones.*
- **Voluntariado en Campañas de Limpieza Ambiental**
  - *Lidera o participa en campañas de limpieza ambiental.*

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07

IMPACTO AMBIENTAL

Toda empresa impacta el medio ambiente, al volverse más sustentable se reduce ese impacto, lo que beneficia al medio ambiente.

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IMPACTO AMBIENTAL

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- **Credito de Carbono**
  - *La compensación de carbono es un proceso en el cual las empresas invierten en proyectos o iniciativas que benefician al medio ambiente, por lo cual esta inversión compensa por las emisiones de carbono de la empresa. Esto no significa que al adquirir el crédito de carbón las emisiones netas de la empresa se reduzcan, sino que el crédito sirve para compensar por esas emisiones. El programa UCC-FONAFIFO gestiona compensaciones de carbono y proporciona recursos para reducir esa huella de carbono.*
- **Certificaciones Ambientales**
  - *Las certificaciones ambientales dictan una pauta a seguir para las empresas que se certifican, esta guía puede facilitar el proceso de establecer un sistema de gestión ambiental. Las certificaciones más comunes en Costa Rica son la ISO 14001, la certificación de Carbono Neutral, y la Bandera Azul Ecológica. Es común que las empresas contraten a un consultor especializado para que los ayude a dar los pasos necesarios para obtener la certificación.*
- **Abastecimiento Ético en Cadenas de Suministros Sostenibles**
  - *El abastecimiento ético requiere que las empresas se aseguren de que los productos y la materia prima que compran sean fabricados o extraídos por proveedores que cumplen con los estándares ambientales y éticos. Estas cadenas de suministros buscan reducir el impacto ambiental durante la vida útil del producto, que incluye la producción, el transporte y la disposición del mismo.*

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