Hecho en Monteverde:

An evaluation of and improved criteria for a voluntary sustainability certification

HECHO EN MONTEVERDE

WORCESTER POLYTECHNIC INSTITUTE 1865 WPI

Hecho en Monteverde: An evaluation of and improved criteria for a voluntary sustainability certification

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by

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Report Submitted to:

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Hecho en Monteverde

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Abstract

The project will improve a local sustainability certification, “Hecho en Monteverde” (HEM). The certification will foster long-term economic resilience through circular and orange economies. The project made the current certification criteria more measurable, feasible, and relevant for food sector businesses. Thirty-three interviews with food businesses, applicants, HEM administrators, and associated organizations informed and reviewed revisions. The twenty-three new food sector criteria can model criteria revisions for other sectors and areas of concern. HEM needs to replicate this criteria revision process and improve application accessibility/marketing.

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- The Monteverde center director, **Melissa Belz**, for organizing this IQP.

Executive summary

Recommendations

As a result of our investigation, findings, and discussion, we have identified a set of recommendations that would serve HEM's goals and purpose. We recommend HEM to:

1. Establish points, standards, and tolerances for the food sector sustainability criteria
    a. Create a point system based on the importance of each criterion to the HEM community
    b. Create standards and tolerances for greater objectivity in assessment
    c. Run pilot tests of the finalized application before using it for the next round of certifications
2. Revise criteria for other the business sectors and areas of concern
    a. Use our method as a guide to polish the rest of the criteria, making the certification as a whole more rigorous and credible
    b. Begin by revamping sustainability criteria in other business sectors since our criteria can be easily tweaked
3. Improve the accessibility of the certification
    a. Host more meetings and training sessions for prospective applicants, where they can learn about sustainable practices
    b. Implement a system of helpers for the filling out of the application that relieves frustration and addresses technological inaccessibility
    c. Incorporate an additional certification for products to expand participation to small unformalized businesses
4. Improve the marketing and outreach approaches
    a. Expand the network of businesses through partnerships and meetings
    b. Persuade consumers to purchase certified products by increasing marketing targeted at both locals and tourists

Background

Monteverde relies on tourists and the environment for economic prosperity. Tourist economies depend on tourism for jobs and ultimately for many residents to make a consistent and reliable living. When an economy relies on tourism, local market participants orient their businesses to the primary market driver, tourists. A tourism-based economy is fickle because of its dependence on a variety of external factors, like foreign wealth and the possibility of travel.

Tourists come to Monteverde for its unique natural environment, so, when the environment suffers, tourism does too. It is important that Monteverde continues its economic development while maintaining its environmental integrity. This ability is being threatened by the rapidly growing community and pressures of a global economy, which are leading to unsustainable practices of mass production. Sustainable development fights back against these pressures to reconcile ecological, social, and economic dimensions of development.

One way of promoting sustainable development in Monteverde is through the circular and orange economies. A circular economy aims to reduce material waste and environmental externalities by focusing on local production and consumption. An orange economy seeks to add value to the cultural practices of a region, preventing them from being washed away by waves of industrialization.

In the late 1980s, the idea of voluntary sustainability certifications emerged as a means of bridging the gap between insufficient government regulations and consumer demand for sustainable goods. Hecho en Monteverde

(HEM) is a local organization that hopes to strengthen the local economy by certifying businesses that promote Monteverde's values. HEM promotes circular and orange ideals through its application's criteria.

Since its creation in 2020, HEM has had one round of applications, in which 18 out of 33 applying businesses were approved. The application and certification processes were unsatisfactory for both the businesses and the organization. The format was inaccessible to many, the assessment was inconsistent due to a lack of quantification, requirements were often impractical to applicants, and the criteria were sometimes ambiguous and irrelevant to businesses. Because of these shortcomings, HEM hopes to improve its criteria and evaluation.

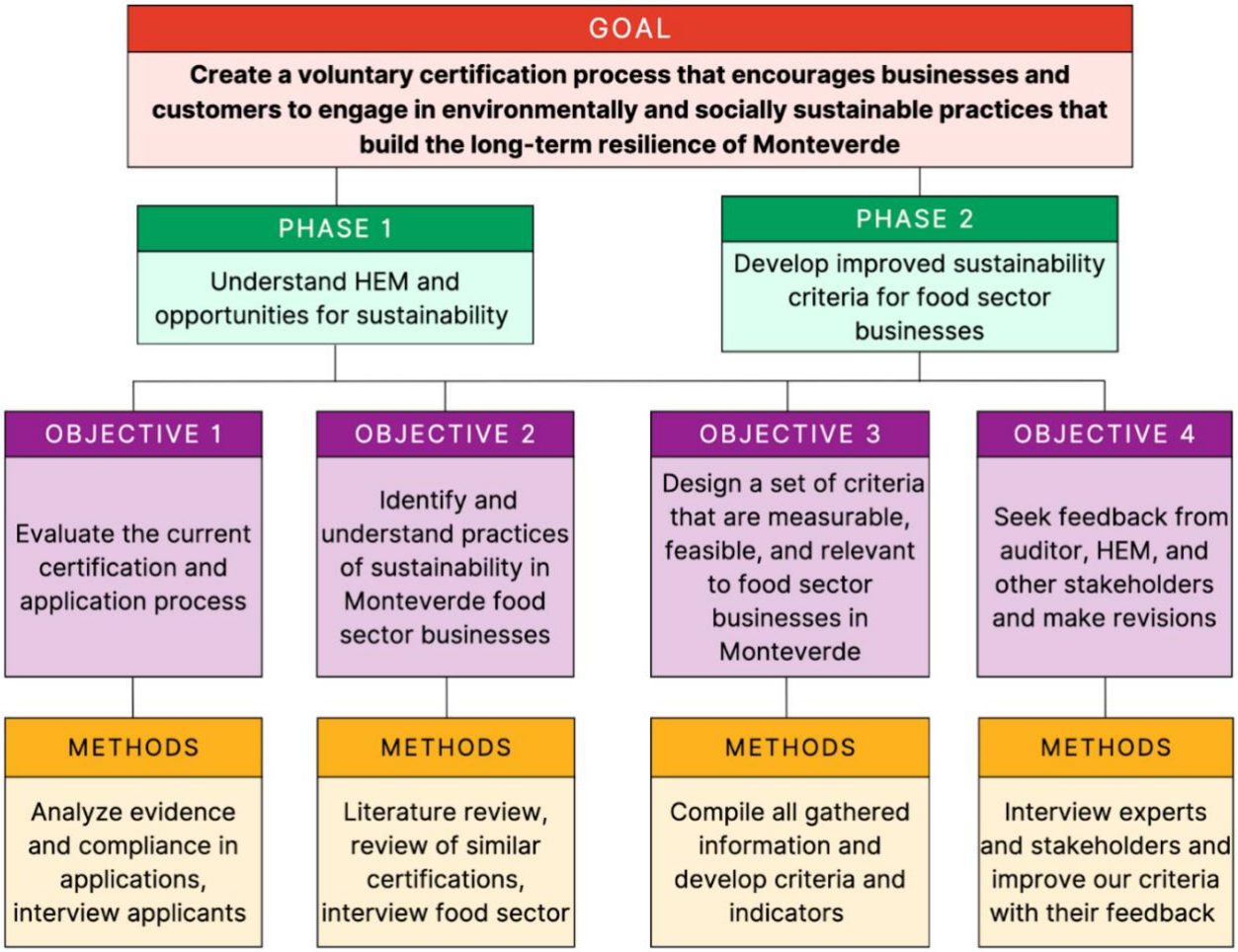
The overarching goal of this project is to create a certification process that encourages businesses and customers to engage in environmentally and socially sustainable practices that build the long-term resilience of Monteverde, Costa Rica. Specifically, our project seeks to address concerns raised by previous applicants and revise criteria to be more measurable, feasible, and relevant. Our project was narrowed down to the food sector and its impacts in the area of sustainability. This intersection was chosen because of its greater capacity for meaningful change and quantification. This allowed us to study the problem deeply and provide a robust model that will guide the revision of criteria in other business sectors and areas of concern.

Methodology

The methodology for this project was divided into two phases with linked objectives, as shown in Figure I. The first phase sought to understand the HEM application and opportunities for sustainability in the food sector. It was composed of two objectives. The first objective evaluated the current certification and application process by looking at applications and interviewing applicants. The second objective identified practices of sustainability in the food sector through a literature review, a review of similar certifications, and interviews of food sector businesses.

The second phase developed improved sustainability criteria for food sector businesses. Again, it was divided into two objectives. The first objective was to design a new set of criteria based on a critique of the previous ones. This critique was based on the measurability, feasibility, and relevance to food sector businesses of each of the criteria. The second objective was to revise our proposed criteria using feedback from the HEM auditor, board, and other stakeholders. All in all, this process allowed us to refine sustainability criteria for the food sector and establish a guide to be followed in the revision of criteria in other business sectors.

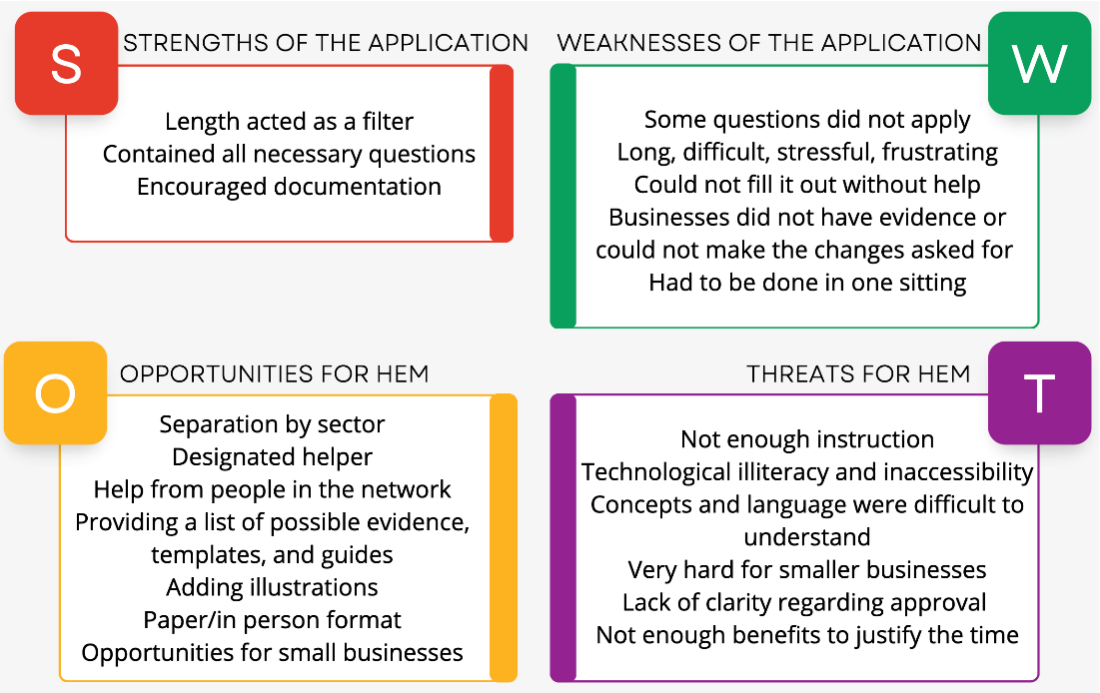
Figure I: Visual depiction of the project's methodology (condensed)



Results

Through analysis of the previous applications and coding of applicant interviews, we found what applicants thought were the main strengths and weaknesses of the application as well as the opportunities for and threats to HEM. These are summarized in Figure II below. Additionally, we found that the assessment of the applications was largely subjective since there were no standards or tolerances set up by the organization.

Figure II: Strengths, weaknesses, opportunities, and threats regarding the HEM application



Using information found from interviews of local food sector businesses, indicators found in the literature review, and a review of exterior certifications, the eight sustainability criteria of the original HEM certification were redeveloped into 23 new criteria. These new criteria were more measurable, feasible, and relevant to food sector businesses. These criteria were then reviewed by HEM's auditor, their board, and other local organizations. Their feedback was incorporated, and the final criteria were delivered. One example of a revised criterion is shown below in Table I. The original criterion, which was unprecise, was operationalized into three, more specific criteria.

Table I: Sample of redeveloped criteria and indicators

Original criterion	Proposed Criterion	Proposed Indicators
Actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitat and ecosystems in the area.	The organization tracks and attempts to source ingredients from local, sustainably certified, non-GMO, non-monoculture, and/or organic suppliers. The organization uses seasonal ingredients when possible. The organization does not include any threatened or invasive species in its products.	Wide variety of species of fruits and vegetables, non-GMO ingredients, polyculture products (more than one type of crop grown), organic ingredients, biodiversity-friendly certified ingredients, seasonal menus, no threatened or invasive species on the menu.
	The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and synthetic fertilizers on its grounds.	Planting native plants, no invasive species in garden, no synthetic fertilizers, natural pest repellents.
	The organization does not feed the local biodiversity and does not lure or exploit wildlife.	No bird feeders, no scraps for wildlife, food waste not available to local fauna

Discussion

Despite the many issues faced by applicants to the certification, it was clear that most saw significant value in the existence of a local sustainability certification. There is substantial support to continue to expand the network and improve the application process. The value of the certification can be summarized by the effect it can have on the success of local businesses, the way that the network encourages collaboration and improvement, and the framework it can establish for interested businesses.

The value of the certification is far-reaching and can help promote the circular and orange economies of the Monteverde region. However, most participants in the interviews mentioned that they had felt no benefits from the certification yet. Although many believed that these benefits would exist in the long-term, some felt frustrated at the lack of tangible rewards for their time and effort spent on the application. We attribute the slow progress to a lack of communication and marketing by HEM.

When the investigation started, we expected the primary obstacle of this certification to be establishing objectivity and credibility in the assessment. However, objectivity and credibility could become obsolete if the certification does not prioritize growth. There is significant demand for the existence of this certification, but its success relies on people knowing of its existence. Businesses had not received marketing materials and local businesses (even ones that fully embodied HEM's values) were not aware of the certification.

Another significant threat to the certification pertained to the accessibility of the application. There was difficulty in filling out the application, with most applicants needing help. The HEM certification is particularly tailored to more established businesses, which left smaller businesses frustrated when they could not meet required criteria.

Aside from the accessibility of the certification, many businesses lacked the education and awareness necessary to partake in the certification. The responses to the sustainability criteria in the application indicated that many did not expect the level of technicality that was involved in the certification. This lack of awareness could potentially affect the number of applicants to the certification and HEM's ability to foster circular and orange ideals in Monteverde.

Authorship table

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1. Introduction		All	All
2. Background	2.1 Vulnerability of tourist-based economies	Pat	All
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3. Methodology	3.1 Objective 1	Paige, Sol	All
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	5.3 Recommendation 3	Sol, Paige	Sol, Pat, Cam
	5.4 Recommendation 4	Paige, Sol	Sol, Pat, Cam
Appendices	Appendix A	All	Paige
	Appendix B	Sol, Paige	Paige
	Appendix C	All	Paige
	Appendix D	Sol, Paige	Paige
	Appendix E	All	Paige
	Appendix F	Sol, Pat, Paige	Paige
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1. Introduction

Monteverde's heavy reliance on tourism has led its communities and businesses to struggle to be resilient economically, environmentally, and socially. Tourist economies depend on tourism for jobs and ultimately for many residents to make a consistent and reliable living. Without tourism, these communities are vulnerable. COVID-19 crushed tourist economies (and the livelihoods of those reliant on them) without warning. With little to no support from the government and a lack of economic diversification, people from Monteverde were forced to leave their homes and seek work elsewhere.

Small businesses like those in Monteverde cannot compete with industrialized global markets, so they are turning away from local production and instead importing cheaper, less sustainable products. Furthermore, businesses cater to tourism, not locals, leading to the touristification of the town and the exclusion of residents from Monteverde. Moreover, tourists come to Monteverde for its unique natural environment, so, when the environment suffers, tourism does too. It is critical that Monteverde focuses on protecting the environment as it works to revitalize and develop a more sustainable local economy.

Several community-based organizations have organized to help local businesses become more resilient. Hecho en Monteverde (HEM) is a local organization that has created a voluntary certification program to encourage sustainable growth. The certification is designed to help people recognize businesses that further Monteverde's values. The overarching goal of this project is to create a certification process that encourages businesses and customers to engage in environmentally and socially sustainable practices that build the long-term resilience of Monteverde, Costa Rica. In this way, the certificate will encourage tourists to collaborate with Monteverde to protect and enhance its diverse environment.

As of 2023, HEM has successfully certified 18 local businesses in one round of certifications. To be certified, businesses must fulfill a set of origin, environmental, and sociocultural requirements (known as the organization's *areas of concern*) that promote community resilience. The certification program benefits local businesses by increasing their market attractiveness and incorporating them into a network of collaborating entrepreneurs. Furthermore, it allows businesses to establish strong brand identities.

However, the application and certification processes were unsatisfactory for both the businesses and the organization. The format was inaccessible to many, the assessment was inconsistent due to a lack of quantification, the requirements were often impractical to applicants, and the criteria were sometimes ambiguous or irrelevant to businesses. Because of this, HEM wants to improve their certification's criteria to become more measurable, feasible, and relevant (D. Vargas, personal communication, November 18, 2022).

HEM plans to do this by reassessing their criteria in respect to each business type HEM has identified (lodging, food, service/guides, agriculture, artisans, and wellness). Moreover, they want to better allocate points in each area of concern in a way that helps draw a direct association between acceptable and unacceptable strides towards meaningful progress. Also, they want to reevaluate the legitimacy and acceptability of different forms of evidence for fulfilling requirements for certification. Finally, HEM wants to make the application process more professional, catered, and accessible for applying businesses. These aspects of a renewed certification will contribute to the mission of HEM.

Specifically, our project seeks to address concerns raised by previous applicants and revise criteria to be more measurable, feasible, and relevant. Our project was narrowed down to the food sector and its impacts in the area of sustainability. This intersection was chosen because of its greater capacity for meaningful change and quantification. This allowed us to study the problem deeply and provide a robust model that will guide the revision of criteria in other business sectors and areas of concern.

To fulfill these goals, we identified two phases encompassing a series of linked objectives that help build a new set of sustainability criteria for food businesses. The first phase explored the current HEM

certification and the intersection of sustainability and the food sector. In the first objective, we analyzed the application and the experiences of previous applicants. In the second objective, we reviewed food sector sustainability literature and similar certifications to HEM as well as interviewed food sector businesses in the area. The second phase consisted of developing new sustainability criteria for food sector applicants. In the third objective, we used the data gathered in the first phase to critique the original criteria and draft a new set of criteria that were more measurable, feasible, and relevant. Last, in the fourth objective, we sought feedback from HEM's stakeholders and its auditor to improve the proposed criteria.

2. Background

We begin this chapter by discussing the unique vulnerabilities faced by communities that rely on tourist-based economies like Monteverde, particularly with respect to the lack of economic diversification and degradation of an environment they depend upon. Second, we explore sustainable development as a strategy to responsibly grow Monteverde's economy while preserving local, sustainable, ethical, and cultural practices. Then, we discuss the idea of sustainability certifications for promoting better consumption and business practices. Fourth, HEM's goals and objectives as well as the focus of the project are discussed to help frame the methodology for this project.

2.1 Vulnerability of tourism-based economies

Tourism can constrain the economy of countries that rely on it. When an economy relies on tourism, local market participants orient their businesses to the primary market driver, tourists. A tourism-based economy is fickle because of its reliance on a variety of external factors. Tourism is affected by season, success of foreign economies, gas prices, global conflicts, natural disasters, and pandemics (Comerio & Strozzi, 2019; Saenz, 2022). A tourism-based economy fundamentally relies on the inflow of foreign wealth. So, if the native economies and nations of the tourists experience a recession or are unable to travel, the tourism-based economy may also experience a similar recession.

2.1.1 Monteverde relies on tourists for economic prosperity

Monteverde has experienced a decreased demand for local exports, and many have opted to refocus their production on the tourism market. Locals have either transitioned to exporting products of greater demand or shifted their markets to serve tourists (Sick, 2008). This decline in production and demand for some of Monteverde's goods and exports has decreased the diversification in the local economy (Comerio & Strozzi, 2019).

A variety of different business sectors have focused their markets around Monteverde's tourism. Hotels, restaurants, guide services, artisans, and wellness services have emerged in the Monteverde community to benefit from the popular tourist destination. A 2021 survey by Daniel Vargas at HEM revealed that virtually all of Monteverde's residents have developed reliance on local tourism (D. Vargas, personal communication, November 18, 2022). During tourism booms, these businesses can be very successful; however, when tourism rates decline, these businesses suffer.

Further instability of tourism markets and the Monteverde economy was experienced when the COVID-19 pandemic hit, leading to global lockdowns and the consequent curtailment of tourist travel. With no tourism, tourist-targeted businesses lacked revenue and could not maintain a viable business, resulting in the collapse of the surrounding local economy (D. Vargas, personal communication, November 18, 2022). The collapse of income in the area can be seen with the loss of 70% of jobs as local businesses were forced to make cutbacks (Hecho en Monteverde, n.d.).

2.1.2. Monteverde relies on its environment for economic prosperity

Tourists traveling to Monteverde primarily partake in ecotourism, a kind of tourism that is focused on nature, wildlife, and conservation. The Monteverde Cloud Forest Preserve draws hundreds of thousands of tourists a year who hope to view such a unique and biodiverse ecosystem. A cloud forest, also called tropical montane, is a mist-fed, high-elevation forest affected by regular cloud immersion (Davis, 2009). Cloud forest ecosystems are uniquely sensitive to anthropogenic climate change, which is caused by the emission of greenhouse gases to the atmosphere. Climate change causes the cloudbank to elevate, leading the forest to have less crucial cloud cover, and resulting in the loss of some of the forest and its species

(Foster, 2001). Reduction of suitable cloud forests ecosystems in Monteverde by climate change limits the area of Monteverde's biggest attraction and thus hinders the capacity for tourism and the economy in Monteverde. Paradoxically, as more tourists enter the town, its environment is further degraded, as will be detailed in the next section.

2.2 Sustainable development

It is important that Monteverde continues its economic development while maintaining its environmental integrity. Monteverde wants to limit its reliance on outside help as much as possible. This ability is being threatened by the rapidly growing community and pressures of a global economy. Sustainable development is an approach that seeks to reconcile ecological, social, and economic dimensions of development to protect the future (Baker, 2016). It represents a "direct challenge to the conventional form of economic development" (Baker, 2016, p. 1), standing against traditional models of modernization which often fuel environmental degradation and social inequality. In this section, the concepts of circular and orange economies are proposed as means of responsible economic growth in Monteverde.

2.2.1 Balancing sustainability in development

Conventionally, development is viewed as global modernization by the example of industrialized nations. In this case, sustainability economics and the environment are viewed as irreconcilable entities (Labović et al., 2021). In contrast, sustainable development emphasizes the dual role of the environment as a consumption good and producer good (Pearson, 2000). This means that nature provides resources necessary for our survival (such as food) as well as resources necessary to produce goods (such as wood). In short, with the philosophy of sustainable development, people and the economy are directly dependent on nature, and must develop accordingly.

Businesses incentivize environmental sustainability because their economic resilience depends on it. A sustainable economy is one that can adapt to unexpected changes from internal events (such as natural disasters) or external events (such as changes in transportation regulations). A sustainable economy is made up of a network of businesses that depend on each other, and the environment uphold themselves. Businesses must collaborate to share and reuse resources and land to ensure that they can be replenished. Finding ways to keep the environment healthy leads to greater resilience of the economy.

2.2.2 The touristification of Monteverde

Monteverde's economy is far from sustainable. The town's growth since the 1980s has resulted in a shift from a primarily local economy to an increasingly globally reliant one. Originally, the closed-off settlement was centered around agricultural products. However, as a result of the town's growth, there has been a decrease in locally produced goods with global competition driving favor for imports (Sick, 2008). In what is known as "touristification," Monteverde has shifted its economic focus from residents to tourists (Kim et al., 2021).

The extreme growth of industrialized markets has developed economies of scale that small businesses cannot compete against, so they turn to selling cheaply made, inauthentic, imported products instead of continuing artisan traditions (Ger, 1999). In food sectors, for example, it is apparent that American goods are being imported (at a high environmental cost) for the comfort of American tourists, who make up the majority of tourists in Costa Rica.

Exacerbating the impacts of development, the town's urban planning is not tailored for a population of 5,000 residents and 250,000 tourists annually (Costa Rica Travel Life, 2022). A visual depiction of the ratio of residents to tourists can be found in **Figure 1**. The insufficiency of urban planning and and rush to accommodate tourists has deep impacts on sustainability. For example, trash piles up on the streets because

waste collection infrastructure cannot keep up with demand (D. Vargas, personal communication, November 18, 2022). Similarly, the completion of a 2017 plan to pave the main roads of Monteverde for improved tourist travel resulted in the emission of hundreds of thousands of tons of carbon dioxide (Alvarado, n.d.). Because tourists are so entrenched in Monteverde's functioning, they need to be included in the development of a resilience strategy. Responsible economic growth that aligns with the town's values and is supported by tourist activity is necessary for sustainable development and resilience in Monteverde.

Figure 1: Comparison of number of residents to annual tourists in Monteverde

Authors' own work based on population data (D. Vargas, personal communication, November 18, 2022; Costa Rica Travel Life, 2022)

2.2.3 Enhancing community values through the economy

There are multiple alternative economies that fall within the realm of sustainable development. One approach to grow the economy responsibly in Monteverde is to shift its economic model to one that focuses on resilience. Resilience in Monteverde includes decreased economic vulnerability, social well-being, reinforcement of cultural practices, and environmental sustainability. We discuss two alternative economies that center these ideals.

The concept of a *circular economy* refers to a model of production and consumption that aims to tackle issues such as climate change, biodiversity loss, waste, and pollution through keeping production and consumption flows local (Ellen MacArthur Foundation, n.d.). Instead of importing goods, locals produce and consume products made in the region, which strengthens the workforce and increases employment. Fostering a circular economy is a strategy for resilience-building since it improves environmental health and self-reliance (Ferronato, 2019).

Some community groups in Monteverde are also interested in the idea of an *orange economy*, which joins economic and cultural sectors to promote the sale of products and services that have artistic or cultural significance (Ferreiro-Seoane et al., 2022). According to its proponents, an orange economy can generate economic value as well as socio-cultural value through social inclusion and cultural diversity. Local artisans

gain a market through which to sell their hand-made products, which are oftentimes made in sustainable ways. Further, an orange economy falls within the realm of the sustainable development goals (SDGs) and may serve as a tool for cultural, social, environmental, and economic resilience (Ferreiro-Seoane et al., 2022).

Enhancing the circular and orange economies of Monteverde depends on initiatives from the ground up that encourage locals to maintain traditions, strengthen family-owned businesses, protect the environment, and support each other. At the same time, transitioning to these models involves communicating and collaborating with tourists about how to have a beneficial impact in Monteverde rather than stripping it of its charm. The implementation of a local voluntary sustainability certification that caters to Monteverde's needs is one possible solution.

2.3 Voluntary sustainability certifications as tools to build resilience

In the late 1980s, the idea of voluntary sustainability certifications emerged as a means of bridging the gap between insufficient government regulations and consumer demand for sustainable goods (Valenciano-Salazar et al., 2022; Lambin & Thorlakson, 2018). Initially, an entity proposes a set of standards that line up with its goals. Then, a business or product pursues approval by providing documentation to be reviewed (Font & Harris, 2004). If they meet the necessary criteria, they typically display a small logo on their product or storefront that certifies their commitment to these ideals. The logic follows that consumers who are conscious about the negative consequences of unethically sourced products will be more likely to purchase from certified brands (Font & Harris, 2004). This way, a market mechanism becomes a sustainability solution.

2.3.1 Sustainability certifications as part of a policy ecosystem

With voluntary environmental certifications and programs (VESCPs), communities enjoy the benefits of more rigorous standards that otherwise take years to be set in place, meaning that certification becomes a form of policy in and of itself, part of a hybrid governance for sustainability (Lambin & Thorlakson, 2018). These authors describe VESCPs as "private (i.e., nonstate) environmental governance attempts to fill the gaps in national and multilateral public policies" (2018, p. 370). Voluntary certifications put the decision of compliance or noncompliance in the hands of people and private entities, allowing them to decide for themselves what values they wish to uphold. This grants them a level of autonomy in standards that is oftentimes reserved for the state.

VESCPs can even incentivize better governmental regulations. One such example is that of dolphin-safe tuna. In the 1980s, the realization that commercial tuna fishing operations were leading to the death of thousands of dolphins yearly triggered a boycott of tuna products (Allen, 2021). Only then did companies begin to change their practices and labeling their products as "dolphin-safe," which finally resulted in the U.S. government passing legislation to regulate and ensure "dolphin-safe" practices. Certifications can therefore become an industry standard or model that is further adopted and even sanctioned.

2.3.2 The wide-ranging benefits of sustainability certifications

It seems counterintuitive that companies would subject themselves to stricter rules than necessary. Yet, social entrepreneurship, the practice of funding the development of solutions to social problems, is gaining popularity among business owners for reasons regarding branding and sales (Cater et al., 2017). Stricter standards will result in higher quality product production, which will make customers willing to pay more and buy more, and consequently increase profits. Moreover, as Ortiz-de-Mandojana and Basal note, "the social and the environmental practices associated with business sustainability not only contribute to short-term outcomes, but also to organizational resilience" (2016, p. 1615).

The voluntary compliance of companies to these standards may improve the community around them in multiple ways. For one, the residents of the producing region enjoy the standards set forth by the organizing entity; they can reap the rewards of fair wages, reduced safety hazards, a stimulated economy, and environmentally friendly practices. Additionally, certification programs can help ensure illegal practices are not taking place. With sustainability certifications, the verifying body acts as an extra layer of scrutiny.

The environment also benefits from changes in business practices towards sustainability. Multilateral agreements like the Paris Agreement, which is designed to combat climate change, are difficult to enforce and rarely meet desired goals (Lambin & Thorlakson, 2018). Hence, VESCPs can address sustainability concerns without relying on governmental bodies and the need to compromise or produce weak regulations (Lambin & Thorlakson, 2018). The certification must be credible so that a consumer can trust it to verify the things that they are unable to.

2.3.3 Obstacles to credibility and implementation

The backbone of voluntary environmental certifications and programs is the credibility of their assessment. However, establishing credibility is the biggest challenge facing sustainability certifications, as the specifics of their verification methods and criteria are questioned (Moynihan et al., 2016; Font & Harris, 2004). Certifications with little credibility jeopardize the effectiveness of other certifications as they reduce the public's trust in these tools. A certification is only as credible as its standards. This includes criteria as well as the relationship between standard-setting and standard-complying entities (Moynihan et al., 2016). Quantifying environmental criteria is already hard enough, but softer definitions of social and ethical success oftentimes elude quantification and are better measured qualitatively, which can lead to less objective assessments (Font & Harris, 2004). To prevent bias in qualitative assessment, standards need to be well-defined though broad, allowing for accurate classification into compliance or noncompliance while also being open to a variety of responses. Additionally, there needs to be a layer of separation between standard-setting and standard-complying entities, which is usually done by hiring outside auditors or organizations for the assessment.

Outside of credibility concerns, there are a variety of obstacles that keep Costa Rican companies from seeking and receiving sustainability certifications despite the benefits they pose. Valenciano-Salazar et al. identify them as difficulty of acquiring evidentiary documentation, high costs, and resistance of employees and stakeholders (2022). Higher credibility certifications require businesses to provide more in-depth documentation, which takes more manpower to acquire, and therefore increases certification fees. Although some view international certifications as more credible, Font and Harris argue that "international programs are more insensitive to local social realities" (2004, p. 990). Therefore, some believe that certifications on a local scale have the biggest impacts. At the same time, they may lack the funding and workforce necessary to conduct extensive verifications. Ensuring credibility of local-sized certifications has significant potential in reforming local sustainability policies worldwide and building community resilience.

2.4 Hecho en Monteverde

The town of Monteverde is an ideal community for developing a sustainability certification based on social, environmental, and economic goals of the region. Since most economic activities are based on ecotourism, tourists are often inclined to buy locally sourced and locally made products to partake in a more authentic Monteverde experience and support the local economy (Valenciano-Salazar et al., 2021). In addition, assurance that their vacation is not perpetuating systems of exploitation and destruction is appealing. Under the premise of strengthening circular and orange economies, the certification HEM was formed.

2.4.1 The organization and its goals

HEM, translated to English as "Made in Monteverde," was created after the COVID-19 pandemic revealed the vulnerabilities of the local Monteverde economy (Hecho en Monteverde, n.d.). The idea of a local sustainability certification aids to develop standards relevant to the Monteverde community. By promoting business and consumption practices that are aligned with the town's values and long-term goals, HEM hopes to help revitalize Monteverde's local economy.

HEM is currently a network of 33 businesses that work towards the common goal of making Monteverde a sustainable community, in terms of environmental, economic, and sociocultural impacts (Hecho en Monteverde, n.d.). The businesses of HEM push for a greater sense of community value and regional identity through encouragement of the local population and businesses as well as tourists to use products and services sourced from Monteverde. The certification seeks to distinguish businesses and products that comply with its standards. It also hopes to establish a collaborative network of certified businesses that can support each other as like-minded entrepreneurs.

2.4.2 Current system of certification

The current certification encompasses six business sectors: lodging, food, service/guides, agriculture, artisans, and wellness. The certification presents a set of requirements that the product or service is categorized in three broad areas of concern: environment, society, and origin. If a business is verified as meeting the HEM's criteria, it becomes part of the HEM network (Hecho en Monteverde, n.d.).

The organization has had one round of certifications as of early 2023. The verification process consisted of the following steps. First, each business filled out a form and provided evidence for each of the requirements set by HEM. Then, a hired outside auditor reviewed the materials and did their own inspection to score each business a zero (does not comply), five (in progress), or ten (complies) on each requirement. Afterwards, the auditor presented their findings and recommendations to HEM, which makes a final decision on the certifiability of a business. The first round approved 18 of 33 applying businesses (D. Vargas, personal communication, November 18, 2022).

When approved, businesses can use the HEM logo in their packaging and stores and are included in the organization's network. Already, the stamp, shown in **Figure 2**, is getting attention from businesses and consumers alike (Hecho en Monteverde, n.d.). Although the number of businesses in the certified network is small now, they aim to expand and encompass as many businesses in Monteverde as possible. HEM plans to have a second round of certifications in 2023. In this second round, HEM hopes to use these new standards to certify more businesses as well as recertify approved businesses.

Figure 2: Hecho en Monteverde stamp

Hecho en Monteverde. (2022). *Hecho en Monteverde Cover Image* [Graphic]. Hecho en Monteverde Facebook. https://www.facebook.com/photo/?fbid=374149571594809&set=a.374149531594813

2.4.3 Revamping standards and impact

HEM is actively looking for new members to expand its impact on contributing to a more circular and orange economy in Monteverde. They have identified that their criteria (especially those that deal with environmental impacts) are not easily measurable and do not cater to the specifics of each business sector. For example, one of their criteria is whether the business is reducing the use of fossil fuels. As a yes or no question, impacts mean very little. If, for example, the criteria read "this business sources 100% of its energy from renewable sources," measurement is more straight-forward. However, sourcing 100% of used energy from renewables is nearly impossible in some sectors. Thus, separate standards and tolerances are required for each business sector, while still complying with the HEM mission.

The current process of certification is neither user-friendly nor verification friendly (D. Vargas, personal communication, November 18, 2022). There is a need to standardize these requirements into a platform that is easily accessible by different business types, as well as by auditors. Moreover, the evidentiary requirements must be consistent for different businesses to ensure objectivity and fairness to applicants. In order to ensure the environmental sustainability of each business, HEM wants to make its criteria more measurable, feasible, and relevant, and its framework more accessible and credible.

2.4.4 Sustainability in the food sector

Some of the criteria in the current application lacks relevance and specificity to food sector businesses, making it difficult to complete. The food sector encompasses all businesses that create and/or sell food and produce, including restaurants, farms, coffee shops, and shops that sell premade products. We chose to focus on the food sector as opposed to other sectors because it has a relatively large and measurable impact on environmental sustainability. For the certification to accurately reflect the food sector's impact, the criteria need to assess the sustainable practices specific to food sector businesses. From the certification, the five areas of impact that food sector businesses have on the environment are the following: water, waste, energy, biodiversity/conservation, and awareness/action.

In the case of waste, restaurants produce a lot of food waste from discarded leftovers and scraps. About one-third of food produced globally (1.3 billion metric tons) is wasted every year, leaving the food sector largely to blame (FAO, n.d.). Additionally, food sector businesses use packaging for deliveries and to store products. Single-use plastics are commonly used for this purpose and have a deep impact on the environment. In general, food sector businesses can reduce their impacts by separating, recycling, reusing, and reducing waste.

Food businesses have environmental impacts related to water. This can generally be seen from two angles: water consumption and wastewater treatment. In terms of water consumption, many food businesses operate with kitchens and use a lot of water for cooking and cleaning. The usage of this water leads to wastewater, which can be polluting and harmful, especially if products containing toxic chemicals are used. To decrease their impact, food businesses can reduce consumption, reuse wastewater (for example, to water plants), and treat their wastewater according to state regulations.

In terms of energy, food sector businesses' primary environmental impacts are from the burning of fossil fuels during transportation and in use for gas stoves. Enviromental impacts due to electricity use are minimal because Costa Rica generates 93% of its electricity from hydropower (Kroposki et al., 2017). To reduce impact, then, it is important to focus on the reduction of fossil fuel consumption, which can be done by using more efficient appliances or transportation methods.

Food businesses' main impact on biodiversity and conservation is through their choice of ingredients. Businesses that use monocultural ingredients indirectly hurt biodiversity by supporting the growth of a single crop over large areas of farmland (Tilman et al., 2001). Additionally, agriculture is the leading cause of deforestation (Lambin et al., 2003), so choosing suppliers carefully is important. There are also other measures food businesses can take within their land, such as planting native species and removing invasive ones.

Awareness and action take a focus on whether the business trains its staff, customers, and collaborators about sustainability practices as well as encouraging more sustainable practices in the community. This is important for businesses to do in order to ensure its sustainability. Furthermore, spreading sustainable practices to other businesses and people in the community can generate a much larger impact.

3. Methodology

This project addressed strengths and weaknesses of the criteria in an existing voluntary certification program to make them measurable, feasible, and relevant to applicants. The methodology section describes how information was gathered, analyzed, and presented to inform the development of revised sustainability criteria for food sector businesses. **Figure 3** shows a summary of the methodology. Criteria improvement was realized through the following four objectives, separated in two phases:

Phase 1: Understand HEM and opportunities for sustainability

Objective 1: Evaluate the current certification and application process.

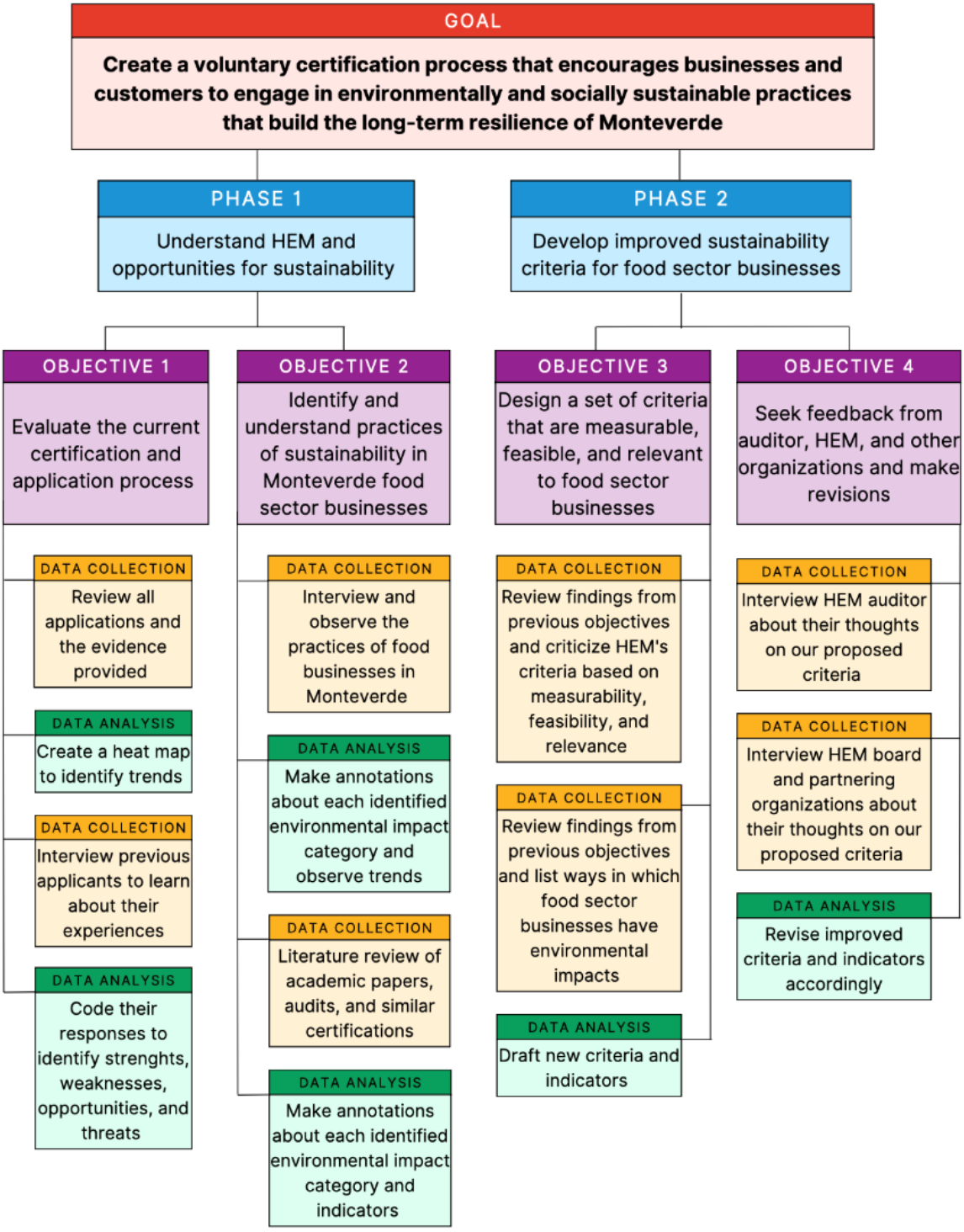
Objective 2: Identify and understand practices of sustainability in Monteverde food sector businesses.

Phase 2: Develop improved sustainability criteria for food sector businesses

Objective 3: Design a set of resilience-building criteria that are measurable, feasible, and relevant to food sector businesses in Monteverde.

Objective 4: Seek feedback from auditor, HEM, and other stakeholders and make revisions.

Figure 3: Visual depiction of the project's methodology



3.1 Objective 1: Evaluate the current certification and application process

The first objective evaluated the current certification's format, criteria, and evidence, as well as analyzed the struggles and nuances of the application process. We used two different methods to do this. First, we reviewed all applications HEM received from all sectors. Second, we interviewed previous applicants, both certified and not. Through these two approaches, we gathered information about the measurability, feasibility, and relevance of the criteria as well as learned more about the accessibility and attractiveness of the certification.

3.1.1 Review of completed applications

Reviewing completed applications helped us understand what evidence was provided and accepted as proof for each criterion. We also gauged how easily criteria could be met by all previous applicants and specifically applicants in the food sector.

Data collection

We had to gather completed applications to review them. We collected 33 completed applications from our HEM sponsor and examined them in depth. Each application consisted of 27 criteria (e.g. questions on waste, energy, water, etc.) and the answers and evidence that each business gave for each criterion. Evidence varied from photographs to written statements to energy bills. Each criterion had been given a number of points by HEM's auditor using this point system:

- 0/10 points were awarded to businesses which did not comply with the standard
- 5/10 points were awarded to businesses which partly complied with the standards
- 10/10 points were awarded to businesses which complied with the standards.

The application had a total of 27 criteria, but because our scope lay in the environmental sustainability sector of the application, we focused on the eight criteria of the application labeled under this topic.

Analytical approach

To complete the first objective, we picked out the environmental sustainability criteria from the current application. There were eight criteria in total; they pertained to topics of water, waste, energy, biodiversity/conservation, and awareness. To sort through these criteria, we first constructed a table with a list of 33 business applicants on one side and a list of the eight criteria on the other. In each cross-cell, we added the type of evidence recorded for each criterion. We kept track of which evidence was accepted for each question and which was not by creating a color-coded table for analysis. In this table, we painted the cells to indicate if the business scored a 0/10, 5/10, or 10/10 and calculated the frequency of each score for each criterion. One row of the table can be seen below in **Table 1**. The full analysis can be found in **Appendix A**. Next, we constructed a bar graph of the scores to assess which criteria applicants complied with most and least.

Table 1: Sample of sustainability criteria score analysis for previous applicant

1. Waste management plan	2. Material reutilization and reduction of waste	3. Wastewater treatment	4. Reduction in water consumption	5. Reduction of fossil fuel use	6. Clean energy and reduction of electricity use	7. Biodiversity and ecosystem protection	8. Awareness about biodiversity and energy efficiency	Sustainability score %
None	Inspection	Inspection	N/A	Use an induction stove	N/A	None	None	56

Research limitations

One research limitation was that some of the scoring and evidence provided was not consistent across all applicants. For example, many had N/A written under evidence if it did not apply to them, but some had received 10/10, while others got 0/10 with no indication why. The inconsistent evidence and scoring made it difficult to establish trends regarding assessment of the applications.

3.1.2 Interviews of previous applicants

Interviewing previous applications let us understand the perceived strengths and weaknesses of the current application. We looked for motives to participate in the application, ideas for general improvements, and critiques to the current certification from applicant business owners.

Data collection

Our sponsor provided us with a list of the 33 applicants and their contact information to set up the interviews. We contacted them all via WhatsApp, phone call, and/or email at the phone number or email provided on the list. In the interview, we asked them questions about their experience with the certification process. First, we determined the applicant's perspective on the certification application. Next, we asked about the applicant's experience with the certification application. Finally, we determined the perceived impacts of the certification on the business. The consent statement and preamble for the interviews can be found in **Appendix B** and the full set of interview questions is available in **Appendix C**.

Analytical approach

Once we completed the interviews, we listened to their recordings and selected important ideas and quotations. We then coded these into strengths, weaknesses, opportunities, and threats. Next, we divided information into three separate analyses for the three categories HEM wanted to learn more about (certification, network, and application) (D. Vargas, personal communication, January 16, 2023). We also sorted responses into general ideas and did a frequency analysis of the data. These general ideas were also further coded into the following categories: value to HEM, application, shortcomings of HEM, and accessibility. This allowed us to see where the certification could be improved and where people commonly had problems.

Research limitations

There were multiple research limitations regarding our previous applicant interviews. Time constraints limited how many applicants we could interview. However, we did reach a point of saturation with the responses, the same comments appearing time and time again. Additionally, the first round of the application was conducted almost two years ago (June 2021) and many of the applicants did not remember the application and the process. Although we gave them a copy of the application to refresh

their memory, they likely forgot some details that may have been helpful. A third limitation was that the initial pool did not fully reflect the characteristics of HEM's target pool, thereby limiting the information available to evaluate the applications for future rounds of certification.

3.2 Objective 2: Identify and understand practices of sustainability in Monteverde food sector businesses

This objective explored what food businesses are currently doing to be environmentally sustainable, what they could do to be more sustainable, and ways that we could measure their sustainability. It helped us identify the possibilities that HEM could encounter. By keeping what HEM would expect to see in mind, we were able to develop better criteria that are measurable, feasible, and relevant. To find out this information, we conducted a literature review about sustainability in food sector businesses as well as investigated other sustainability certifications and their criteria. Then, we interviewed food sector businesses around Monteverde and learned from their practices.

3.2.1 Review of literature and similar certifications

The review of literature and other sustainability certifications was carried out to gain a better idea about what food businesses are already doing in terms of sustainability and how similar certifications are assessing compliance.

Data collection

We reviewed eleven academic papers about sustainability in the food sector and explored sustainability certifications from Costa Rica. We found articles that described sustainability practices and quantification in food sector businesses. Furthermore, we reviewed four local certifications that our sponsor recommended: CST, Bandera Azul, ICT, and Esencial Costa Rica. We recorded pertinent criteria and evidentiary requirements.

Analytical approach

To analyze these papers and certifications, we categorized findings into the five main topics of water, waste, energy, biodiversity/conservation, and awareness/action. For each category, we recorded potential criteria and/or evidence related to the environmental impact of the food industry that could be useful in crafting our proposed criteria.

Research limitations

One issue we encountered in our research was that there were not a lot of papers from Costa Rica, so we had to supplement the information with findings based on American food businesses. Another limitation was that the size and type of food businesses could lead to different sustainability practices, yet most of the information available was about restaurants.

3.2.2 Interview of food sector business

The purpose of this subobjective was to interview food sector businesses so that we can understand what food businesses are currently doing to be sustainable, how they can be more sustainable, as well as how we can measure their sustainability.

Data collection

We contacted food sector businesses of Monteverde via WhatsApp and phone calls using information available on Google as well as contacts provided by our sponsors. Food sector businesses included large restaurants, small restaurants, at-home operations, food shops, and bakeries. In general, the semi-

structured interviews asked about their knowledge of HEM and thoughts about certifications, the ways in which they were being environmentally sustainable, and relevant information about their business's size and consumption levels (number of customers, energy consumption, water consumption, and waste production). The consent statement and preamble for the interviews can be found in **Appendix D** and the full set of interview questions is available in **Appendix E**.

Analytical approach

We gathered information from the interviews and organized it into a chart with the businesses listed on the rows and interview questions listed on the columns. We wrote responses to each question by each business interviewee in the cross-cells. It was especially important to analyze the interview questions where businesses simply could not provide an answer, since this meant that they would not have been able to do so on the HEM application either. Then, we conducted a frequency analysis of the responses.

Research limitations

This part of the research was limited in two ways. First, we had insufficient proficient language speakers on the team. This limited our time so we couldn't conduct as many interviews as we would have liked. Only one bakery and one at-home operation were interviewed. Second, our method of contact limited the pool of businesses we considered for interviews in number and kind.

3.3 Design a set of resilience-building criteria that are measurable, feasible, and relevant to food sector businesses in Monteverde

In this objective, the purpose of the methodology shifted from certification analysis to criteria construction, beginning the second phase of objectives. Using the evidence gathered from the first two objectives, we found the strengths and weaknesses of each of the criteria based on their measurability, feasibility, and relevance. Then we listed ways in which a food sector business could have an impact on each of the criteria's topics, identified through literature review and food sector business interviews. Lastly, we drafted proposed versions of criteria that were more measurable, feasible, and relevant to food sector businesses and promoted a sustainable economy through circular and orange ideals.

3.3.1 Identify strengths and weaknesses of criteria

This subobjective critiqued the existing criteria to identify gaps in measurability, feasibility, and relevance to be addressed in the creation of new criteria.

Data collection

The eight criteria regarding sustainability were collected from the HEM application. We used all findings from the first phase of objectives.

Analytical approach

The three guiding concepts of a good criterion (measurability, feasibility, and relevance) directed the analytical approach. Measurability was defined as the ability of the criterion to be objectively quantified by an auditor, usually using an indicator, such as efficiency of appliances. Feasibility was defined as the degree to which the criterion could be met by a food sector business or measured by an auditor. Relevance was defined as the importance the criterion had to HEM's goals as well as to food sector businesses. Each of the eight sustainability criteria in the application were examined in this way using a chart. An example of a critique appears below in **Table 2**.

Table 2: Sample critique of original biodiversity criterion

Original criterion: The organization actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitat and ecosystems in the area.		
	Strengths	Weaknesses
Measurability	Potentially measurable through indicators	No feasible way of quantifying impacts of conserving biodiversity or natural habitats
Feasibility	Food sector businesses can select their suppliers, use biodiversity friendly ingredients, promote conservation on their grounds, etc.	Many food sectors lack knowledge about their impact on the natural habitat and biodiversity
Relevance	Food sector businesses can have deep impacts on biodiversity and their natural habitat, Monteverde's biodiversity should be protected in particular	Much of food sectors' impact on biodiversity and natural habitat relies on supply chains they may not be able to control

Research limitations

A limitation of this approach is that the measurability, feasibility, and relevance of a criterion may vary within food sector businesses, but HEM considers different food business types under the same umbrella.

3.3.2 Define the sustainability indicators of food sector businesses

This subobjective mapped out ways in which a food sector business could affect each of HEM's criteria, which allowed for the establishment of possible sustainability indicators.

Data collection

We used the early analysis of food sector business interviews from Objective 2.2 (Interview of food sector business) to determine ways in which food sector businesses might introduce or modify practices to achieve greater sustainability. Additionally, we used the information gathered through the literature review and certification review of Objective 2.1 (review of literature and similar certifications).

Analytical approach

The data collected was compiled to create a list that summarized the possible ways in which food sector businesses could have an impact on each of the criteria. This list helped identify indicators that could be used to quantify whether a business acts sustainably or not. An example is shown below in **Table 3**.

Table 3: Sample indicators for biodiversity criterion

Original criterion: The organization actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitat and ecosystems in the area.		
Indicators		
Ingredients	Practices in premises	Participation
Wide variety of species of fruits and vegetables, non-GMO, organic, biodiversity-friendly certified, no threatened or invasive species	Reduction of pollution, planting native species, removing invasive species, diminishing use of fertilizers and pesticides	Participation in conservation efforts, partnerships with organizations, donations to conservation efforts

Research limitations

One limitation of our approach was that there is no clear boundary of when the environmental impacts of a food sector business end, so it was difficult to decide when the consequences were too far removed. For example, water use could encompass the water used in a food business's kitchen and bathrooms but could also extend to the water use for irrigation in the farms where the business derives its ingredients from.

3.3.3 Draft proposed versions of criteria

This subobjective was the heart of our project. The first goal was to identify useful information gathered in the first phase of the methodology. Then, the goal was to construct a deliverable that could be used by HEM to improve their application, and as a result, their certification.

Data collection

The criteria found in the certifications explored in Objective 2.2 (Interview of food sector business) were compiled based on which HEM criterion or desired outcome they most resembled. Then, the information gathered in the previous components of Objective 3 in addition to the interview responses provided by food sector businesses of Objective 2.1 (Review of literature and similar certifications) were revisited.

Analytical approach

New criteria were developed using the information obtained from all previous objectives. The strengths and weaknesses of the measurability, feasibility, and relevance for the original HEM criteria were considered first. Then, the indicators were considered. With this in mind, each criterion was constructed using simple and clear language that directly asked applicants for the answers HEM seeks. The criteria were evaluated to ensure they were measurable, feasible, and relevant.

Research limitations

The research was limited by the challenge to write measurable but not overly specific criteria. For example, making criteria for details in a kitchen (e.g., number of lightbulbs) is impractical information to track, but questions that are too general (e.g., are you using renewable energy?) are unquantifiable.

3.4 Seek feedback from auditor, HEM, and other organizations and make revisions

This objective collected feedback on the draft criteria from the HEM auditor, members of HEM and partnering organizations that was then used to revise the proposed criteria. Their responses allowed us to ensure our improved criteria aligned with their circular and orange ideals. This objective was vital to gather an understanding of compliance Monteverde food business standards have the criteria be as measurable as possible, feasible for applying businesses, and relevant to HEM's values.

3.4.1 Consult and revise questions based on feedback from HEM auditor

This subobjective collected feedback from the HEM auditor. The auditor was the one who conducted HEM's first round of evaluations and provided vital feedback to the application criteria and process. The auditor feedback gave us a better understanding of the measurability, feasibility, and relevance of our revised criteria from the perspective of an evaluator.

Data collection

An interview was conducted with the HEM auditor. She is an expert in the sustainability field. The drafted criteria were presented to the auditor to receive her opinion of our revised criteria. This feedback was vital to determine the ability of the auditor to assess our propositions in practice. Additionally, the auditor was asked about ways in which the application could be filled without the use of technology.

Analytical approach

All of the auditor's recommendations were analyzed and amended in the criteria. Similarly, recommendations were considered to maximize the measurability, feasibility, and relevance of the criteria. An example of the revisions can be seen below in **Table 4**. The full list of auditor feedback and revisions can be found in **Appendix F**.

Table 4: Sample of auditor revisions of drafted biodiversity criteria

Original criterion: The organization actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitat and ecosystems in the area.	
Proposed criteria	**Proposed indicators**
The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and fertilizers on its grounds. The organization tracks and makes an effort to source ingredients from sustainably certified, non-GMO, organic, or local suppliers. The organization does not include any threatened or invasive species in its products.	Ingredients: Wide variety of species of fruits and vegetables, non-GMO, organic, biodiversity-friendly certified, no threatened or invasive species
	Practices in premises: Planting native species, removing invasive species, diminishing use of fertilizers and pesticides
	Participation: Participation in conservation efforts, partnerships with organizations, donations to conservation efforts
Auditor feedback: Add non-monoculture ingredients, could also include no products from large polluter corporations, add no feeding animals	
Revised criteria	**Revised indicators**
The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and fertilizers on its grounds. The organization tracks and makes an effort to source ingredients from sustainably certified, non-GMO, non-monoculture, organic, or local suppliers. The organization does not include any threatened or invasive species in its products. The organization does not feed the local biodiversity and does not lure or exploit wildlife.	Ingredients: Wide variety of species of fruits and vegetables, non-GMO, non-monoculture, organic, biodiversity-friendly certified, no polluter corporation products, no threatened or invasive species
	Practices in premises: Planting native species, removing invasive species, diminishing use of fertilizers and pesticides, no birdfeeders, no food scraps left for wildlife, no wildlife attractions
	Participation: Participation in conservation efforts, partnerships with organizations, donations to conservation efforts

Research limitations

HEM has only had one auditor, so we only had the singular opinions of one experienced evaluator. Additionally, the auditor has not been in consistent contact with the organization since the original round of applications, so they may be unaware of the changes and goals that HEM seeks.

3.4.2 Consult HEM board members and other organizations for feedback and revise questions

This subobjective received further feedback from the members of HEM and other organizations. Their feedback was used to further develop our criteria and recommendations to align with their circular and orange ideals while balancing the measurability, feasibility, relevance.

Data collection

A meeting with HEM advisors and the rest of the board was scheduled and our revised criteria and recommendations were presented. We also received feedback from two other organizations that HEM worked with to originally create the criteria. We asked for their opinions to further gather an understanding of the success of our recommendations regarding HEM's ideals and the guiding principles of measurability, feasibility, and relevance.

Analytical approach

HEM and the other organizations' recommendations to our criteria were analyzed and considered to provide further revisions to our developed criteria and recommendations to the certification system. Their feedback was used to determine revisions to the criteria that would maximize measurability, feasibility, and relevancy. An example of the revisions can be seen below in **Table 5**. The full list of HEM and other organization feedback and revisions can be found in **Appendix G**.

Table 5: Sample of HEM and other organizations revisions of drafted biodiversity criteria

Original criterion: The organization actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitat and ecosystems in the area.	
Proposed criteria	**Proposed indicators**
The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and fertilizers on its grounds. The organization tracks and makes an effort to source ingredients from sustainably certified, non-GMO, non-monoculture, organic, or local suppliers. The organization does not include any threatened or invasive species in its products. The organization does not feed the local biodiversity and does not lure or exploit wildlife.	Ingredients: Wide variety of species of fruits and vegetables, non-GMO, non-monoculture, organic, biodiversity-friendly certified, no polluter corporation products, no threatened or invasive species
	Practices in premises: Planting native species, removing invasive species, diminishing use of fertilizers and pesticides, no birdfeeders, no food scraps left for wildlife, no wildlife attractions
	Participation: Participation in conservation efforts, partnerships with organizations, donations to conservation efforts
HEM and other organization feedback: Explain what a polyculture product is. Change "or" to "and." Switch order to prioritize local suppliers. Add something about seasonal ingredients. Add native plants in gardens, no bare soil, minimal light at night. Change fertilizers to synthetic fertilizers.	
Revised criteria	**Revised indicators**
The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and synthetic fertilizers on its grounds. The organization tracks and makes an effort to source ingredients from local, sustainably certified, non-GMO, non-monoculture, and/or organic suppliers. The organization uses seasonal ingredients when possible. The organization does not include any threatened or invasive species in its products. The organization does not feed the local biodiversity and does not lure or exploit wildlife.	Ingredients: Wide variety of species of fruits and vegetables, non-GMO ingredients, polyculture products (more than one type of crop grown), organic ingredients, biodiversity-friendly certified ingredients, seasonal menus, no threatened or invasive species on the menu.
	Practices in premises: Planting native plants, no invasive species in garden, no synthetic fertilizers, natural pest repellents.
	Participation: Participation in conservation efforts, partnerships with organizations, donations to conservation efforts

Research limitations

One research limitation of this approach is that we were only able to meet with a few members of the board since many of them have multiple jobs and are not up to date on the workings of the organization.

4. Results and discussion

This chapter presents the results gathered from the methodology and discusses our findings in relation to the goal of this project. The first section organizes the results by the four objectives. The second section organizes the analysis and discussion based on the conceptual ideas that arose from our findings. All in all, this chapter summarizes and digests the information that built our deliverables, recommendations, and conclusions.

4.1 Results

4.1.1 Objective 1: Evaluate the current certification and application process

The review of 33 previous applications showed that there were the following eight criteria regarding sustainability (translated from Spanish to English):

1. The organization has designed, delivered, and executed a comprehensive waste management plan in accordance with the requirements of Law No. 8839: Law for comprehensive waste management.
2. The organization reuses materials and minimizes waste in the complete cycle of the product or service offered.
3. The organization treats its gray and black water through a wastewater garden, septic tank, or other treatment plan that ensures efficient treatment. In the case of reusing wastewater, the organization complies with the legal requirements of Regulation No. 33601: Regulation of wastewater discharge and reuse.
4. The organization reduces the annual consumption of water per person or per unit of production
5. The organization reduces the use of fossil fuels: gasoline, diesel, bunker, liquefied petroleum gas. In the case of not consuming fossil fuels, select "Other," specify that you do not consume these and answer question 2.04 about electricity consumption.
6. The organization uses clean energy and reduces electricity consumption.
7. The organization actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitats and ecosystems in the area.
8. The organization demonstrates efforts to train/sensitize its stakeholders: collaborators, customers, suppliers, and/or community on issues associated with sustainable development, biodiversity, conservation, and efficient production.

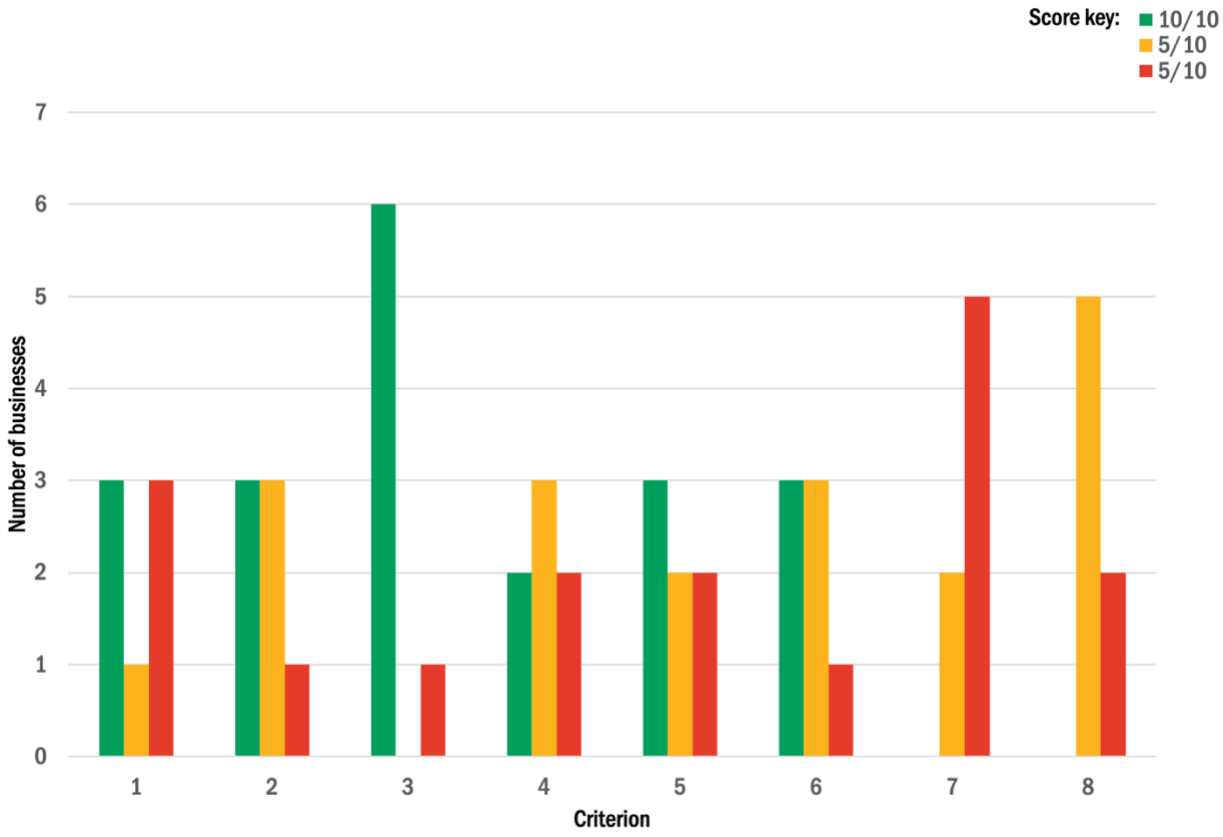
A color-coded table, shown below in **Table 6**, was generated based on the degree of compliance with criteria (red: 0/10, yellow: 5/10, green: 10/10) and the kind of evidence that each food sector business provided. The top row lists the businesses; those colored in green were approved, those in red were not. As shown, there were multiple instances where “inspection” was listed as the evidence provided, even though there were no further clarifications as to what was seen. Additionally, we found that the evidence was largely insufficient to prove compliance. The full table, which includes all businesses who applied, can be found in **Appendix A**.

Table 6: Sustainability criteria score analysis for food sector applicants

Food sector business	A	B	C	D	E	F	G
1. Waste management plan	None	None	None	Plan of the mall it is a part of	Summary of objectives	N/A	N/A
2. Material reutilization and reduction of waste	None	Inspection	Inspection	Photograph of product packaging	None	Compost and reutilization of materials	Reutilization program with providers and consumers
3. Wastewater treatment	None	Inspection	Inspection	Residual water chemical analysis	None	Septic tanks and biogardening	N/A
4. Reduction in water consumption	None	None	N/A	Inspection	None	Want to have a rainwater collection system to wash solids	N/A
5. Reduction of fossil fuel use	None	None	Use an induction stove	N/A	None	N/A	Optimization of delivery routes
6. Clean energy and reduction of electricity use	None	Use natural light during the day	N/A	Inspection	Solar panels	Efficient light bulbs	N/A
7. Biodiversity and ecosystem conservation	None	None	None	None	None	No plastic bags, they participate in trash collection initiatives	None
8. Awareness about biodiversity and energy efficiency	None	Inspection	None	Photograph of paper bags with logo	Photograph of a class promoting sustainability	Promote plant-based and local diets	Have the initiative but have not been able to implement it
Sustainability score %	0	38	56	63	63	75	75

Figure 4 is a graphical view of the scores awarded to food sector businesses. The criterion that was complied with most easily was the third, which dealt with treating wastewater. This was expected because food sector businesses face rigorous health regulations from the government. On the other hand, the last two criteria, which dealt with biodiversity and spreading awareness, scored the lowest.

Figure 4: Graph of points awarded to food sector businesses in each of the criteria



Interviews of 17 previous applicants were carried out. Ten of these belonged to the artisan sector, three to the food sector, three to the services sector, and one to the lodging sector. The main points made by each of the interviewees were coded based on whether they related to the certification, the application, or the network. The categories of strengths, weaknesses, opportunities, and threats were used to sort them. The graphics below (Figure 5, Figure 6, and Figure 7) summarize the important points that were repeated by applicants. The full findings can be found in Appendix H.

Figure 5: Strengths, weaknesses, opportunities, and threats regarding the network

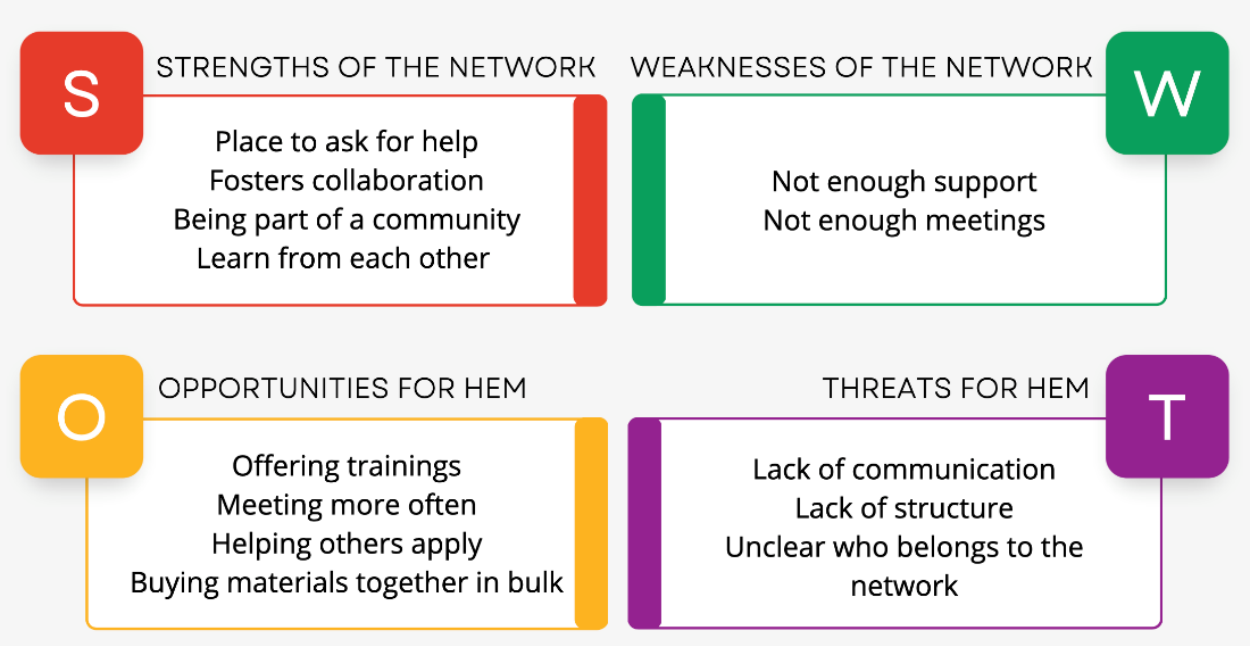


Figure 6: Strengths, weaknesses, opportunities, and threats regarding the application

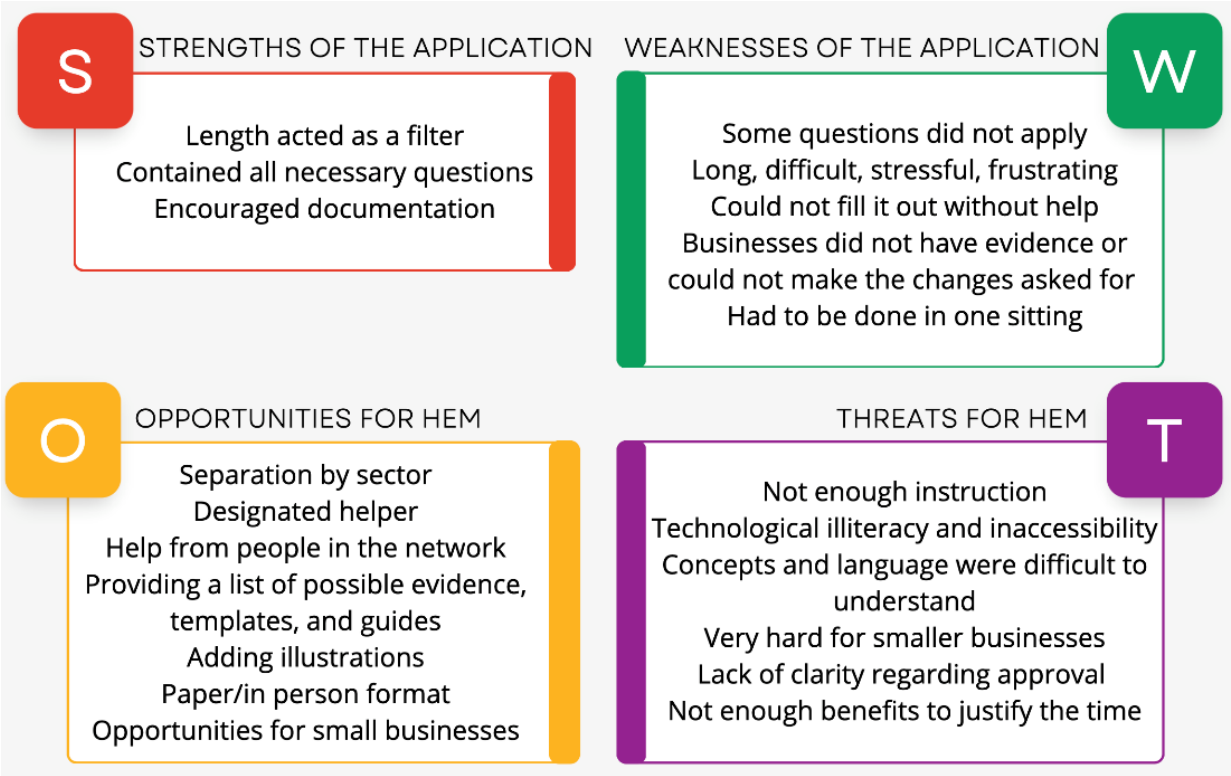
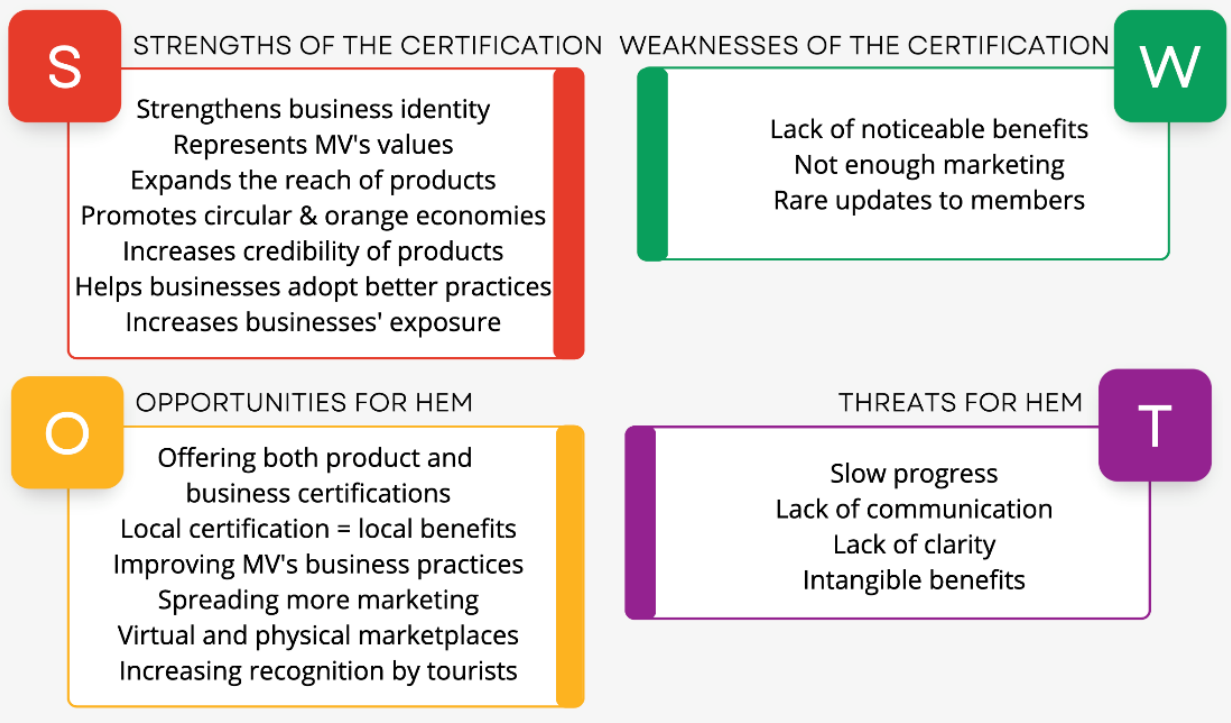


Figure 7: Strengths, weaknesses, opportunities, and threats regarding the certification



The main ideas that participants repeated were also coded based on the categories: accessibility, application, value of HEM, and shortcomings of HEM. A frequency analysis was done on this and can be found in **Table 7**. Some of the points that were most often mentioned were the network bonds the community, people needed help to fill out the application, evidence was too hard to provide, the certification had no benefits yet, and there was a lack of marketing by HEM.

Table 7: Frequency analysis of previous applicant interviews

Category	General ideas/opinions	# of businesses	Total
Accessibility	Needed help to fill out application	10	23
	Had problems with using or accessing technology	6	
	Did not understand criteria	4	
	There is a need for templates, explainers, illustrations in the application	3	
Application	Application was long	8	32
	Evidence was hard to provide	8	
	Criteria did not apply to their business	6	
	Want the possibility of certifying both products and businesses	4	
	There were too many demands from small businesses	6	
Value of HEM	Certification helps establish a business/Monteverde identity	11	42
	The network bonds the community to work together	11	
	Certification is an opportunity to learn and implement better practices	6	
	Certification could help the business reach customers	6	
	Certification represented their values	5	
	Certification helps establish their products	3	
Shortcomings of HEM	No benefits yet	8	27
	There is a lack of marketing by HEM	7	
	There is a lack of communication by HEM	7	
	Unclear on whether they were certified	5	

4.1.2 Objective 2: Identify and understand practices of sustainability in Monteverde food sector businesses.

In our second objective, we obtained an understanding of the areas of environmental sustainability and how they pertain to the food sector by looking at literature and similar certifications. We used eleven journals and articles (see **Appendix I**) as well as four certification programs for our analysis (Bandera Azul, CST, Esencial, and ICT) (see **Appendix J**). The findings could be generally categorized by topics of waste, water, energy, biodiversity/conservation, and awareness/action.

External criteria evaluated food sectors waste management systems and measured the amount of waste that was produced. Criteria dictated that businesses' waste management systems should include adequate and separate waste containers for different types of waste, a collection system and center for their waste, and proper disposal of hazardous material. Businesses were asked to minimize waste and develop a plan for waste management relevant to their business size that did not produce adverse effects to the environment.

According to the external water criteria, businesses should record metrics of their water usage and keep their water consumption low and proportional to their business size. The criteria also required that businesses use authorized sources of water as well as develop and adhere to a plan regarding water usage. Additionally, criteria of these certifications dictated that businesses should maintain pipes to avoid leaks. Regarding wastewater, these certifications encouraged businesses to have adequate wastewater treatment and record metrics of their wastewater. Adequate wastewater treatment according to these certifications requires that wastewater is properly contained, treated, and discharged in a manner that does not pollute the surrounding environment.

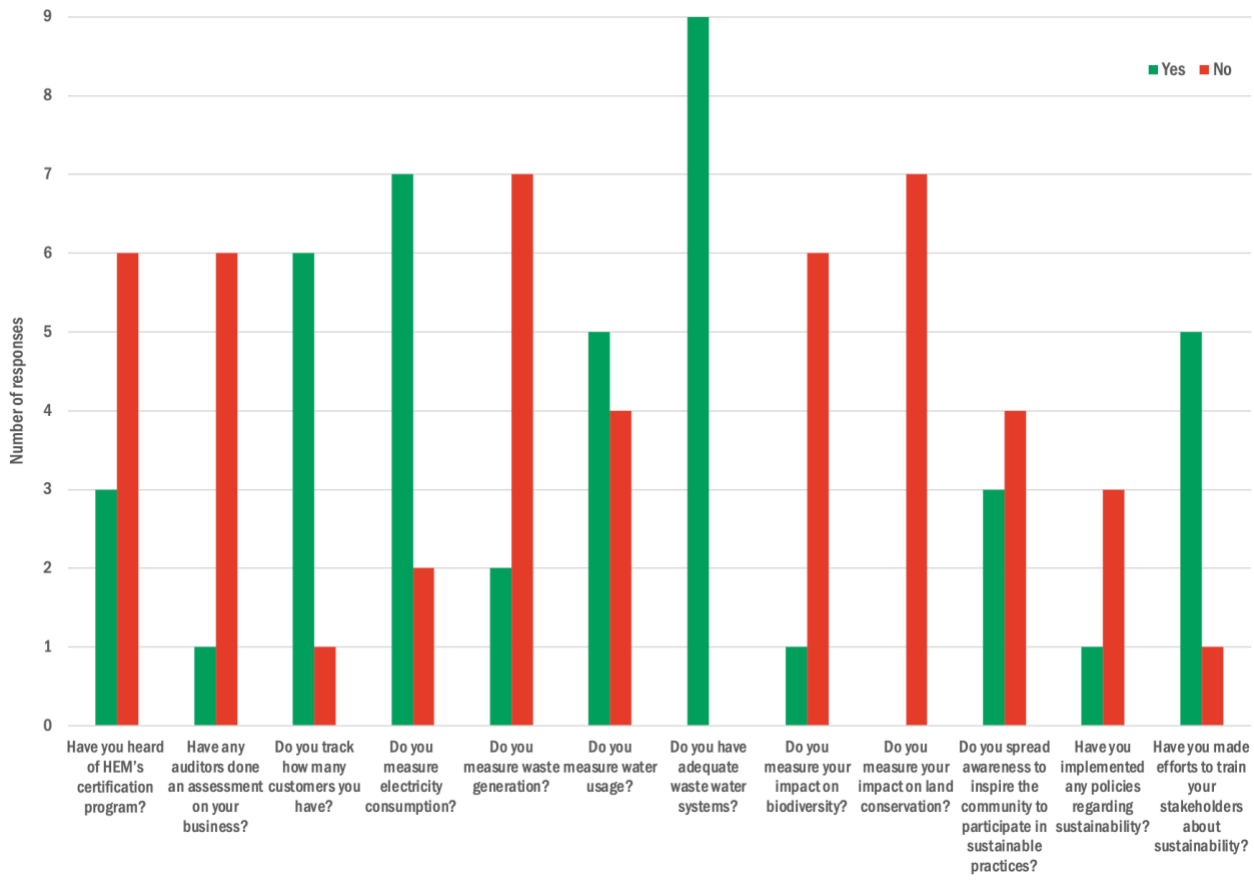
Energy criteria of external certifications evaluated sustainable uses of energy by measuring overall energy use, fossil fuel use, electricity use, renewable energy use, efficiency of equipment, and carbon footprints. Businesses were encouraged to practice regular maintenance to their equipment, utilize efficient lighting sources, minimize transportation, and develop and adhere to an energy reduction plan.

In terms of biodiversity conservation, external certifications held that businesses can be more sustainable by only using products cultivated from legal flora and fauna and avoid the use exotic or invasive species. Additionally, these criteria encouraged businesses to consider how products are cultivated to utilize and support the most sustainable food products. Finally, the businesses should make attempts to restore and protect the environment to counteract the cultivation of their products while informing their stakeholders of their efforts to further encourage these ideals.

Last, we examined criteria of the four external certifications requirements regarding evaluation of awareness and action. Criteria of the external certifications included a written sustainable policy that is adhered to and identifies negative effects of the business's sustainability. Additionally, businesses should attempt to train and market to internal and external stakeholders that reflect the business' efforts and values, buy certified and organic products, and help other businesses though volunteering, financing, or sharing facilities.

Through the frequency analysis on the food sector interviews shown in **Figure 8,** we found out how the nine food sector businesses we interviewed measured and improved their impact on the five categories of environmental sustainability. The full findings are in **Appendix K**.

Figure 8: Frequency analysis of food sector interviews



Regarding waste, only one business weighed the amount of waste they produced. One knew, vaguely, how many trash bags they used. Still, the grand majority separated and recycled their waste. Monteverde has a particularly ineffective trash collection system, illustrated by **Figure 9**. Businesses reported that they collected recyclables for weeks before driving to recycling centers. Multiple businesses identified their waste production as a main sustainability concern and made efforts to reduce waste. Examples of these efforts included only offering straws and chopsticks upon request, switching to reusable or biodegradable packaging, selling used oils to produce biodiesel, using organic waste as pig or chicken feed, and using reusable containers when picking up ingredients. However, some expressed frustration that some suppliers packaged their products unsustainably, but that these products were the most competitive in the market, so they chose to buy them. Some businesses also expressed that they could not replace the benefits of plastic, in particular the fact that it is transparent and waterproof.

Figure 9: Buildup of trash on the side of the road in Monteverde

In the water category, we found that businesses who measured water use did so through their monthly bills. The businesses that did not measure their water use were usually those that carried out their operations from their homes. All businesses treated their wastewater before discharge. Half of the businesses said that washing dishes was their biggest use of water. Most businesses said they made efforts to reduce the spending of water for economic or sustainability reasons. Some of these efforts included only washing full loads of dishes and washing dishes at low water pressure.

For energy, less than half of businesses reported having efficient appliances. The most common way of measuring energy usage by businesses was through monthly electricity bills. At-home operations or businesses that had shared electricity meters could not differentiate the electricity usage of the food sector business itself. No businesses kept track of their electricity usage in kWh; rather, they kept track of how much they had to pay. In terms of gas usage, businesses often did not know how much they used, but thought it was possible to implement practices to measure it. Commercial kitchens usually counted with an energy-efficient layout. In terms of efforts towards energy savings, businesses unplugged devices, kept the lights off during daylight hours, installed solar panels, used energy-efficient light bulbs, reduced the number of long trips to suppliers, and maintained/repaired appliances.

From the biodiversity/conservation category questions, we found that most businesses did not know they could have an impact on this area. Many were initially confused, and further questions had to be asked

to receive the answers we sought. Some believed that if they were not actively polluting the environment, they could have no impact on biodiversity and habitat protection. Because of this, almost no businesses measured their impacts. The most common practice employed that protected biodiversity was thoughtfulness when purchasing ingredients. This included sourcing ingredients from organic farms and buying certified meats.

Lastly, for awareness and action, half of businesses said that they did not actively spread awareness to inspire the community to participate in environmentally sustainable practices. A few trained employees in sustainable practices, sometimes with the help of local organizations. One business mentioned a promotion they employed to help the community waste less: if a customer spent over a certain amount, they would receive reusable chopsticks with their purchase.

4.1.3 Objective 3: Design a set of resilience-building criteria that are measurable, feasible, and relevant to food sector businesses

The eight sustainability questions, listed in section 4.1.1, in HEM's certification were analyzed by identifying strengths and weaknesses regarding the measurability, feasibility and relevance of the criteria. The strengths and weaknesses are shown below in **Table 8**.

Table 8: Strengths and weaknesses of original criteria

Criteria	Measurability		Feasibility		Relevance	
	Strengths	Weaknesses	Strengths	Weaknesses	Strengths	Weaknesses
1. The organization has designed, delivered and executed a comprehensive waste management plan in accordance with the requirements of Law No. 8839: Law for comprehensive waste management.	Built as a yes or no question	No mention of separating waste or measuring it	Most food sector businesses will have this due to health codes	N/A	Food businesses produce a lot of waste	N/A
2. The organization reuses materials and minimizes waste in the complete cycle of the product or service offered.	Potentially measurable	There is no measurement unit used, and many food sector businesses do not keep track of the waste they generate	Many food sector businesses try to minimize, reuse, and sell waste	N/A	Food businesses produce a lot of waste	N/A

Table 8: Strengths and weaknesses of original criteria (continued)

Criteria	Measurability		Feasibility		Relevance	
	Strengths	Weaknesses	Strengths	Weaknesses	Strengths	Weaknesses
3. The organization treats its gray and black water through a wastewater garden, septic tank, or another that ensures efficient treatment. Likewise, in the case of reusing wastewater, it complies with the legal requirements of Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater.	Built as a yes or no question	No mention of sources of wastewaters, number of tanks, pollution levels	Most food sector businesses will usually have this due to health codes	N/A	Food sector businesses produce wastewater from their kitchens and bathrooms	N/A
4. The organization reduces the annual consumption of water per person or per unit of production.	Annual water consumption is easily measurable through bills	"Reduces" is not defined, no baseline water consumption level, businesses may get water from non-municipal sources	Food sector businesses should be able to acquire this kind of evidence as they keep track of expenses or by installing water meters	High and low tourism seasons may prevent a downward trend in usage, reducing water consumption is not always possible (especially for food shops that use very little to start with)	Food sector businesses usually spend water	It may not apply to food shops
5. The organization reduces the use of fossil fuels: gasoline, diesel, bunker, liquefied petroleum gas.	Direct fossil fuel usage is easily measurable through bills and receipts	"Reduces" is not defined, timeline is not defined, no baseline, some food sector businesses share these bills with other businesses (for example, they might be part of a hotel)	Food sector businesses should be able to acquire this kind of evidence as they keep track of expenses	Reducing fossil fuel consumption is not always possible, high and low tourism seasons may prevent a downward trend in usage	Food sector businesses generally consume gas in their kitchens	Food shops may not use fossil fuels except for transportation

Table 8: Strengths and weaknesses of original criteria (continued)

Criteria	Measurability		Feasibility		Relevance	
	Strengths	Weaknesses	Strengths	Weaknesses	Strengths	Weaknesses
6. The organization uses clean energy and reduces electricity consumption.	Electricity consumption is easily measurable through bills and receipts	Built as a yes or no question that does not quantify the use of clean energy, "reduces" is not defined, no baseline, some food sector businesses share these bills with other businesses	Food sector businesses should be able to acquire this kind of evidence as they keep track of expenses	Use of clean energy can vary month-to-month based on the electric company, reducing consumption is not always possible, high and low tourism seasons may prevent a downward trend in usage	Food sector businesses spend electricity in kitchens and in customer spaces	N/A
7. Actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitat and ecosystems in the area.	Potentially measurable through indicators	No real way of quantifying efforts of conserving biodiversity or natural habitats, more effort based	Food sector businesses can track their supply chains and aim to use a variety of products promoting preservation of biodiversity and natural habitats, they can also plant native	Many food sectors lack the awareness of their impact on the natural habitat and biodiversity	Food sector businesses can have significant impacts on biodiversity and their natural habitat	Much of food sectors' impact on biodiversity and natural habitat rely on supply chain outside of food sector businesses
8. The organization demonstrates efforts to train/sensitize its stakeholders: collaborators, clients, suppliers and/or the community on issues associated with sustainable development, biodiversity conservation and efficient production.	Potentially measurable through indicators	No real way of quantifying advertisement of conservation awareness or programs	Food sector businesses can create initiatives to promote conservation within their business and advertise to the public	Many food sectors lack the knowledge or resources of how to develop sustainable programs	Food sector businesses can promote better sustainable values through advertisement of these values	Smaller food businesses may not have the outreach or size to establish initiatives

Indicators for each of the eight certification questions were then drafted to establish ways to evaluate the criteria. Additionally, these indicators aided in the creation of revised criteria for the sustainability category of the certification targeting food sector businesses. Drafted indicators for the original HEM criteria are below in **Table 9.**

Table 9: Drafted indicators of criteria

Original criteria	Indicators
1. The organization has designed, delivered and executed a comprehensive waste management plan in accordance with the requirements of Law No. 8839: Law for comprehensive waste management.	Separation of waste, treatment of hazardous waste, adequate containers, tracking waste generation, existence of plans to reduce generation.
2. The organization reuses materials and minimizes waste in the complete cycle of the product or service offered.	Usage of recyclable or biodegradable materials, separation of waste, recycling and repurposing materials, plan to minimize waste, measurement of waste, composting, minimization of material (especially plastic) use, proper waste disposal, usage of all parts of ingredients.
3. The organization treats its gray and black water through a wastewater garden, septic tank, or other treatment plan that ensures efficient treatment. In the case of reusing wastewater, the organization complies with the legal requirements of Regulation No. 33601: Regulation of wastewater discharge and reuse.	Presence of separate septic tanks, presence of a wastewater garden, control of wastewater generation, soil contamination levels, water body contamination levels, groundwater contamination levels, wastewater contamination levels at discharge, tracking wastewater generation, existence of plans to reduce consumption.
4. The organization reduces the annual consumption of water per person or per unit of production.	Bills and receipts of water consumption, usage of water-efficient appliances, efforts/plan to reduce water usage, prevention of leaks, maximization of water usage (for example, full loads of dishes).
5. The organization reduces the use of fossil fuels: gasoline, diesel, bunker, liquefied petroleum gas. In the case of not consuming fossil fuels, select "Other," specify that you do not consume these.	Bills and receipts of fossil fuel usage, transportation methods, offsetting efforts, heating systems, existence of plans to reduce consumption, energy-efficient appliances, periodical energy audits, usage of local ingredients.
6. The organization uses clean energy and reduces electricity consumption.	Presence of on-site renewable energy generation, electricity bills, existence of plans to reduce consumption, kitchen layout, energy-efficient appliances, energy-efficient lighting, availability of natural light, routine maintenance of appliances, energy audits.
7. Actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitats and ecosystems in the area.	Wide variety of species of fruits and vegetables, non-GMO ingredients, organic ingredients, biodiversity-friendly certified ingredients, reduction of pollution, participation and/or advertisement of efforts to preserve, partnering with conservation organizations, planting native plants, no threatened or invasive species on the menu.
8. The organization demonstrates efforts to train/sensitize its stakeholders: collaborators, clients, suppliers and/or the community on issues associated with sustainable development, biodiversity conservation and efficient production.	Plan to educate employees on conservation, advertisement of values to customers, signs or regulations about sustainability in the business, sourcing from sustainable producers, posters, certifications on dishes/products, donations, hosting community events about sustainability.

Using the strengths and weaknesses of the measurability, feasibility, and relevance for the original HEM criterion along with the drafted indicators for each criterion, new criteria were drafted. These criteria aimed to increase the measurability of the criterion while maintaining the feasibility and relevance to Monteverde food businesses. All in all, the original eight criteria became 23 improved ones.

To improve the measurability of the first criterion regarding a comprehensive waste management plan, two new sub-criteria were drafted. We felt it was necessary to split separation and treatment of waste from measurement and plan for the reduction of waste. This would aim to improve the measurability and ability to reduce waste production.

New criteria for the second criterion, minimization of waste and recycling of materials, were similarly developed into three sub-criteria. The first sub-criterion required organizations to use biodegradable, recycled, and recyclable materials whenever possible. This would ideally minimize the production of waste detrimental to the surrounding environment. Next, organizations were required to minimize waste in the complete cycle of the product offered meaning that waste of a product was accounted for throughout the entire time of its possession. Finally, the criteria required organizations to develop and adhere to an annual plan to reduce waste production to ensure reduction.

The third criterion regarding wastewater was redesigned with two new sub-criteria. The first criterion of wastewater was designed to ensure organizations met the legal requirements of wastewater treatment and discharge in Costa Rica. This criterion dictated that wastewater, including gray and black water, be appropriately treated and discharged per Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater. The other sub-criterion aimed to minimize the amount of wastewater the organization produced. This criterion asked for the organization to reuse or repurpose wastewater whenever possible.

The fourth criterion regarding water consumption was redrafted to improve the measurability and efficiency of water consumption in food businesses. Three sub-criteria were drafted. The first aimed to improve the measurability of water consumption and required that organizations monitor metrics of water usage. Additionally, it requires that organizations track either the number of customers or products they have and calculate water usage per person or unit of production. Next, to improve a business's ability to reduce water consumption, a criterion was drafted that required organizations to develop and adhere to a plan that decreased water consumption and maximized efficiency of water usage. Finally, to improve the efficiency of water consumption, a criterion dictated that organizations utilize water-efficient appliances.

The fifth criterion regarding fossil fuel usage was redrafted as well. Three sub-criteria were drafted to improve the measurability of fossil fuel consumption. The first sub-criterion dictated that the organization monitors metrics of fossil fuel usage and utilizes renewable energy when possible. This criterion ideally would improve the measurement of fossil fuel usage within food sector businesses. Additionally, a sub-criterion was drafted dictating that the organization has designed and adheres to an annual fossil fuel usage plan that weans carbon dioxide and other greenhouse gas emissions. This criterion aimed to guide the reduction of fossil fuel usage within food sector businesses. Finally, sub-criterion was drafted to reduce fossil fuel consumption in transportation that dictated that organizations promote cleaner alternative methods of transportation.

HEM's sixth criterion regarding electricity consumption and renewable energy use were also amended into three sub-criteria. The first sub-criterion aimed to increase the measurability and knowledge of electricity consumption. The criterion dictated that organizations monitor metrics of electricity consumption and perform periodic energy audits of the business. Sub-criteria were also drafted to increase the electrical efficiency of food businesses. This criterion dictated that organizations incorporate energy efficient appliances, lighting, and kitchen layout (if applicable). Periodic maintenance would also be required for appliances and equipment to ensure their efficiency. Finally, criteria were drafted that required organizations to develop and adhere to a plan that minimizes electricity consumption and aims to get

electricity from cleaner sources. This criterion ensures that a written plan is set in place to reduce electrical consumption.

New criteria for the seventh criterion regarding conservation was amended from HEM's original criteria to clarify specific efforts to improve conservation efforts of biodiversity and the surrounding ecosystem. Two sub-criteria were drafted. One necessitated that organizations track and source ingredients from sustainably certified, non-GMO, organic, or local suppliers. Additionally, this criterion dictated that organizations do not include any threatened or invasive species in their products. This criterion would ideally improve the impact that production of food businesses goods has on the environment and biodiversity. Finally, a criterion was drafted to require sustainable cultivation of the land that food businesses occupy. The criterion included that the business plant native species and remove invasive species from its grounds. As well as that organizations minimize the use of pesticides and fertilizers on its grounds.

Finally, HEM's eight criterion, awareness and action, was redeveloped into three sub-criteria. The first sub-criterion required organizations to develop sustainability policies and train their staff to abide by these regulations. This was to ensure that the businesses were active in conservational efforts throughout their operation. Additionally, a criterion was drafted to promote circulation of the applying organization's conservational values. This criterion dictated that organizations educate their staff, customers, collaborators, and the community about environmental sustainability. Finally, a criterion was drafted to ensure that organizations adopt the sustainability values of HEM. This criterion enforced that organizations actively participate and encourage others to participate in sustainability practices and initiatives that reflect the values of HEM.

4.1.4 Objective 4: Seek feedback from auditor, HEM, and other stakeholders and make revisions

HEM's auditor provided revisions for each of the revised criteria. These are shown in detail in **Appendix F**. Auditor comments were incorporated to improve the drafted criteria and indicators. The criteria incorporating the auditor's comments were shown to HEM's board and partner organizations, as shown in **Appendix G**. This was done as a pilot run with the creators of the original criteria to see how our drafted criteria fit within their values and goals. They provided further thoughts on the proposed criteria and indicators. Our revisions made to indicators and criteria based on their feedback and amendments can be seen below in **Tables 10-14**. Then, we added explainers for each of the criteria, shown in **Appendix L**.

Table 10: Feedback and amendments to proposed waste criteria

Proposed criteria	Proposed indicators	Feedback	Final criteria	Final indicators
The organization properly separates and treats waste in the following categories: reusable, recyclable (glass, aluminum, plastic, paper), compostable, hazardous, and disposable.	Separation of waste, treatment of hazardous waste, adequate containers.	Change language to match Regulation 8839, ensure language reflects full cycle of the product, ask for the regulation's template as evidence, evidence of accomplishment of the plan, ask for receipts/corroboration of taking the waste to the management centers. Be explicit about refrigerants and the management of refrigerant gases. Ask for a registry of measurements of waste. Ask for businesses to weigh their trash. Ask for a plan for organic waste.	1. The organization properly separates and treats waste in the following categories: ordinary (separated into glass, packaging, paper and cardboard, and organic), hazardous, and special treatment.	Separation of waste, treatment of hazardous waste, treatment of special treatment waste (including batteries and refrigerants), adequate containers.
The organization measures and tracks its waste, as well as develops and adheres to a plan for waste management.	Tracking waste generation, existence of plans to reduce generation.		2. The organization weighs and tracks its waste, as well as develops and adheres to a comprehensive plan for waste management (including organic waste) in accordance with the requirements of Law No. 8839.	Tracking waste generation, existence of plans to reduce generation, completion and adherence to Law No. 8839, evidence of compliance with Law No. 8839, full cycle waste plan for products, receipts from waste management centers, specific plans for organic waste.
The organization uses biodegradable, recycled, and recyclable materials whenever possible.	Usage of recyclable or biodegradable materials, separation of waste, recycling and repurposing materials, composting.	Add specifics about what these should be (biodegradable should be degradable in 28 days, 65-70%), ask for scientific/technical documents that certify this. It's important where biodegradable products go, all need to be composted and many need extra processing. Change "complete cycle" to "complete life cycle." Change minimization of material use to minimization of disposable products. Add reused along with recycled.	3. The organization uses biodegradable, reused, recycled, and recyclable materials whenever possible.	Usage of recyclable or biodegradable materials, proof biodegradability (65-70% degradation in 28 days), separation of waste, recycling and repurposing materials, composting, proper handling of biodegradable and recyclable materials.
The organization minimizes waste in the complete cycle of the product offered.	Measurement of waste, minimization of material (especially plastic) use, usage of all parts of ingredients.		4. The organization minimizes waste in the complete life cycle of the product offered.	Measurement of waste, minimization of material use (especially plastic) use, reduction of disposable products, usage of all parts of ingredients.
The organization has developed and adheres to an annual plan to reduce waste production.	Plan to minimize waste, proper waste disposal, proof of adherence.		5. The organization has developed and adheres to an annual plan to reduce waste production.	Plan to minimize waste, proper waste disposal, proof of adherence.

Table 11: Feedback and amendments to proposed water criteria

Proposed criteria	Proposed indicators	Feedback	Final criteria	Final indicators
Wastewater, including gray and black water, is appropriately treated and discharged per Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater.	Presence of separate septic tanks, control of wastewater generation, soil contamination levels, water body contamination levels, groundwater contamination levels, wastewater contamination levels at discharge, tracking wastewater generation, existence of plans to reduce consumption.	Include the new Regulation No. 42075 about filtering water, which many businesses do not comply with. Add installation of dry toilet and record of septic tank maintenance to indicators. Add ways to treat wastewater in parentheses. Change wording to say, "when applicable." Ask for grease traps. Be specific about using grey water for irrigation/watering plants. Add something about using products without harmful chemicals (for example, detergent).	6. Wastewater, including gray and black water, is appropriately filtered, treated (through a septic tank, wastewater garden, or other), and discharged when applicable per Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater and Regulation No. 42075: Regulation for Groundwater Discharge of Treated Wastewaters.	Presence of separate septic tanks, installation of dry toilet, record of septic tank maintenance, grease traps, control of wastewater generation, soil contamination levels, water body contamination levels, groundwater contamination levels, wastewater contamination levels at discharge, tracking wastewater generation, existence of plans to reduce consumption, filtration system for wastewater.
The organization reuses or repurposes wastewater whenever possible.	Wastewater garden, wastewater collection.		7. The organization reuses or repurposes water whenever possible. The organization uses products without harmful or persistent chemicals.	Wastewater garden, recycling of useable wastewater, rainwater capture, use of grey water for irrigation, kinds of chemicals used in detergents and others.
The organization monitors metrics of water usage. The organization calculates water usage per person or unit of production.	Bills and receipts of water consumption	Add more common examples for maximization of water usage. Ask for a list of water sources the organization uses, since not everyone gets them only from the state. Add "month-to-month wording." Add rainwater capture to indicators. Put dry composting toilets and low flush toilets as examples of water efficient appliances.	8. The organization monitors metrics of water usage from all water sources utilized monthly. The organization calculates water usage per person or unit of production.	Bills and receipts of water consumption, presence of flow meters, tracking of customers/products produced and their water consumption.
The organization has developed and adheres to a plan that decreases water consumption and maximizes efficiency of water usage.	Efforts/plan to reduce water usage, maximization of water usage (ex. full loads of dishes,)		9. The organization has developed and adheres to an annual plan that decreases water consumption and maximizes efficiency of water usage.	Efforts/plan to reduce water usage, rainwater capture, maximization of water usage (ex. full loads of dishes, washing in bulk).
The organization utilizes water efficient appliances.	Usage of water-efficient appliances, prevention of leaks.		10. The organization utilizes water efficient appliances and/or has a plan to phase inefficient ones out following their life cycles.	Usage of water-efficient appliances (such as dry composting or low flush toilets), prevention of leaks.

Table 12: Feedback and amendments to proposed energy criteria

Proposed criteria	Proposed indicators	Feedback	Final criteria	Final indicators
The organization monitors metrics of fossil fuel usage and utilizes renewable energy when possible.	Bills and receipts of fossil fuel purchases, periodical energy audits.	Focus on reducing usage. Add examples of fossil fuels, especially liquid petroleum gas which is used in gas stoves. Look at the Costa Rican decarbonization plan for ideas. Include using alternative routes, carpooling, etc. Add water heating systems to indicators. Deprioritize offsetting efforts from indicators. Give examples of cleaner means of transportation (walking, biking, collective transport) Change carpooling to collective transport. Replace alternative routes with using an electric vehicle or offering a charging station for electric vehicles.	11. The organization monitors metrics of fossil fuel (gasoline, diesel, bunker, liquefied petroleum gas, etc.) usage monthly, reduces usage, and utilizes renewable energy when possible.	Bills and receipts of fossil fuel purchases, periodical energy audits.
The organization has designed and adheres to an annual fossil fuel usage plan that weans carbon dioxide and other greenhouse gas emissions.	Offsetting efforts, heating systems, energy efficient appliances, maintenance of appliances, existence of plans to reduce consumption.		12. The organization has designed and adheres to an annual fossil fuel usage plan that reduces carbon dioxide and other greenhouse gas emissions.	Efficient heating systems (including water heaters), energy efficient appliances, maintenance of appliances, existence of plans to reduce consumption, offsetting efforts.
The organization promotes cleaner alternative methods of transportation.	Transportation methods, usage of local ingredients.		13. The organization promotes cleaner methods of transportation (walking, biking, EVs), participates in collective transport, and/or increases efficiency in routes.	Transportation methods, usage of local ingredients, alternate routes, collective transport (carpooling, buses, shuttles, trains), EVs, offering EV charging stations.

Table 12: Feedback and amendments to proposed energy criteria (continued)

Proposed criteria	Proposed indicators	Feedback	Final criteria	Final indicators
The organization monitors metrics of electricity consumption and performs periodic energy audits of the business.	Electricity bills, energy audits.	Efficient appliances might come with an inventory and transition period. On-site electricity generation is not the best option because the matrix is already 95% clean and there are problems with disposal. Ask for a specific table of electricity consumption. Add clarity for has a plan to phase out inefficient ones following their life cycle. Add specifics for what makes kitchen layout important. Specify the equipment/appliances to be properly disposed (refrigerators, freezers, air conditioners, dehumidifiers). Add solar water heating to indicators.	14. The organization monitors metrics of electricity consumption monthly and performs periodic energy audits of the business.	Electricity bills, energy audits, detailed records of electricity consumption.
The organization incorporates energy efficient appliances, lighting, and kitchen layout (if applicable). Periodic maintenance is performed on appliances and equipment to ensure their efficiency.	Kitchen layout, energy-efficient appliances, energy-efficient lighting, availability of natural light, routine maintenance of appliances		15. The organization incorporates energy efficient appliances, lighting, and kitchen layout (if applicable), and/or has a plan to phase out inefficient ones following their life cycles. Periodic maintenance is performed on appliances and equipment to ensure their efficiency.	Kitchen layout (heat away from cold), energy-efficient appliances, energy-efficient lighting, availability of natural light, routine maintenance of appliances, transitionary plan that estimates usable life of equipment and considers efficient options for replacement, proper disposal of old equipment/appliances (such as refrigerators, freezers, air conditioners, dehumidifiers, etc.).
The organization has developed and adheres to a plan that minimizes electricity consumption and aims to get electricity from cleaner sources.	Presence of on-site renewable energy generation, existence of plans to reduce consumption	Change minimizes energy consumption to maximizes energy efficiency. Be specific about getting energy from clean sources, not including onsite generation. Include something about having less impact on biodiversity and people from light pollution.	16. The organization has developed and adheres to a plan that minimizes electricity consumption and maximizes energy efficiency. The plan aims to get electricity from clean sources and diminish the impacts of light pollution on the community and wildlife.	Presence of on-site renewable energy generation, electricity matrix, solar water heating, existence of plans to reduce consumption, turning off lights whenever possible.

Table 13: Feedback and amendments to proposed biodiversity conservation criteria

Proposed criteria	Proposed indicators	Feedback	Final criteria	Final indicators
The organization tracks and makes an effort to source ingredients from sustainably certified, non-GMO, organic, or local suppliers. The organization does not include any threatened or invasive species in its products.	Wide variety of species of fruits and vegetables, non-GMO ingredients, organic ingredients, biodiversity-friendly certified ingredients, no threatened or invasive species on the menu.	Add non-monoculture ingredients, could also include no Coca-Cola or similar products. Explain what a polyculture product is. Change "or" to "and." Switch order to prioritize local suppliers. Add something about seasonal ingredients. Add no feeding wildlife. Add native plants in gardens, no bare soil, minimal light at night. Change fertilizers to synthetic fertilizers.	17. The organization tracks and makes an effort to source ingredients from local, sustainably certified, non-GMO, non-monoculture, and/or organic suppliers. The organization uses seasonal ingredients when possible. The organization does not include any threatened or invasive species in its products.	Wide variety of species of fruits and vegetables, non-GMO ingredients, polyculture products (more than one type of crop grown), organic ingredients, biodiversity-friendly certified ingredients, seasonal menus, no threatened or invasive species on the menu.
The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and fertilizers on its grounds.	Planting native plants, no invasive species in garden.		18. The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and synthetic fertilizers on its grounds.	Planting native plants, no invasive species in garden, no synthetic fertilizers, natural pest repellents.
—	—		19. The organization does not feed the local biodiversity and does not lure or exploit wildlife.	No bird feeders, no scraps for wildlife, food waste not available to local fauna

Table 14: Feedback and amendments to proposed awareness/action criteria

Proposed criteria	Proposed indicators	Feedback	Final criteria	Final indicators
The organization has developed sustainability policies and trains its staff to follow them.	Plan to educate employees on conservation, signs, frequent training.	Add criterion about suppliers (an overview of sustainability can be done with just looking at providers). Add implementation of plan to indicators. Ask for a specific sustainability statement that guides action and mindset. Add clients to the list. Add examples of where donations would go. Change "exterior" to "local, exterior." Add specific values of importance, like water. Add regenerative production to indicators.	20. The organization has developed a sustainability mission statement and policy and trains its staff to follow them.	Plan to educate employees on conservation, signs, frequent training, proof of implementation of plan, sustainability statement that guides action and practices.
The organization educates its staff, customers, collaborators, and the community about environmental sustainability.	Advertisement of values to customers, signs or regulations about sustainability in the business, posters, certifications on dishes/products.		21. The organization educates its staff, customers, collaborators, and the community about environmental sustainability.	Advertisement of values to customers, clients, signs or regulations about sustainability in the business, posters, certifications on dishes/products,
The organization actively participates and encourages others to participate in sustainability practices and initiatives that reflect the values of HEM.	Donations, hosting community events about sustainability, collaboration with external sustainability organizations.		22. The organization actively participates and encourages others to participate in sustainability practices and initiatives that reflect the values of HEM, specifically in the areas of water conservation, reduction of greenhouse gas emissions, and biodiversity conservation.	Donations to local sustainability initiatives, hosting community events about sustainability, collaboration with local external sustainability organizations.
—	—		23. The organization carefully chooses suppliers that follow sustainable environmental and social practices. The organization diminishes reliance on supplies from large corporations that do not adhere to sustainability goals.	List of supply chain for products, regenerative production, prioritization of sustainable producers, avoidance of large corporation producers.

4.2 Discussion

The organization Hecho en Monteverde seeks to foster the concepts of circular and orange economies in Monteverde to improve the resilience of the town. HEM does this by offering a voluntary sustainability certification to local businesses that helps establish their identity, increases their market reach, and leads to greater collaboration among certified entrepreneurs. Our project has set out to improve the certification after a first round of applications. We analyzed the application process, the certification, and the sustainability practices of the food sector to draft and revise a new set of sustainability criteria for food sector businesses. In this process, we gained great insight and knowledge about the strengths and weaknesses of the HEM network, certification, and application process. Additionally, we learned about limitations to objectivity and measurability of certifications overall.

4.2.1 There is value and demand for a local sustainability certification

Despite the many issues faced by applicants to the certification, it was clear that most saw significant value in the existence of a local sustainability certification. There is significant support to continue to expand the network and improve the application process. The value of the certification can be summarized by the effect it can have on the success of local businesses, the way that the network encourages collaboration and improvement, and the framework it can establish for interested businesses.

One of the most salient points made by interviewees was that the certification could help establish an identity or brand for both the businesses and Monteverde as a whole. As tourists become more and more conscious of their impact on Monteverde, it is reassuring to know that their money is ending up in the hands of local business owners who operate sustainably. Moreover, interviewees held that being certified could allow them to sell their products to resellers with more ease. The certification would grant their products a higher level of credibility and value. Businesses believed that being certified would allow them to grow their businesses due to increased revenues although most indicated they had not yet felt these benefits.

Applicant interviewees also believed that the network aspect of the certification was extremely valuable. This was the most mentioned benefit of the certification by applicants. Having a network of successful local entrepreneurs to collaborate with was a major reason for applying. In terms of sustainability, food sector businesses mentioned that the network could help them contact better suppliers and buy ingredients in bulk. Some businesses reported that they took frequent trips to the national capital of San José to pick up ingredients. The constant back and forth transportation have adverse effects on the environment, that could be reduced if businesses planned trips together. Furthermore, the inclusion of criteria that encourage food sector businesses to source ingredients and supplies from other certified businesses may lead to a circularity within HEM and Monteverde. In short, the certification and network can not only certify current efforts of sustainability but inspire further steps.

Another significant point that arose from our investigation was that the application could be used as a guide for local businesses to learn and adopt better practices of sustainability. Many businesses knew how to collect the evidence necessary for the HEM certification but did not. Some food sector businesses expressed that our visit had reignited those thoughts and that they would start keeping track of their sustainability indicators more often. Additionally, food sector business owners often lacked awareness about what sustainable practices in the food sector constituted, especially regarding biodiversity conservation. Applicant interviewees suggested that the application be separated by sector and the criteria be more specific to help businesses take appropriate steps to be more environmentally sustainable.

4.2.2 A lack of marketing and communication slow progress for HEM

The value of the certification, as outlined in the previous paragraphs and in section 2.3.2, is far-reaching and can help promote the circular and orange economies of the Monteverde region. However, most participants in the interviews mentioned that they had felt no benefits from the certification yet. Although many believed that these benefits would exist in the long-term, some felt frustrated at the lack of tangible rewards for their time and effort spent on the application. We attribute the slow progress to a lack of communication and marketing by HEM.

The applicants who held hope for future benefits were usually those that were closely connected to the certification and had more frequent contact with the organization's board. The ones that did not have frequent contact felt completely disconnected from the certification and had received few updates following their application. Some were even confused about whether they had been approved for the certification. The confusion often stemmed from HEM asking for additional evidence, but never following up with businesses after they provided it. Without certainty, these businesses could not begin to advertise themselves and their products with the certification's stamp. In the coding of the interviews, many presented this lack of communication as a threat to the certification's success. Interestingly, while we were in

Monteverde, the network met for the first time in a year. The businesses who we interviewed after this date expressed that they had enjoyed the meeting because it allowed them to be up-to-date and to reconnect with the network. Many wished for more frequent collaboration between members and felt both that the organization and themselves were at fault for the lack of it.

The second reason for slow progress was the lack of marketing materials provided by HEM to approved businesses. There are two layers to HEM's need for publicity. First, they need to market better to the customers, most of which are tourists. Second, HEM needs to recruit more businesses who want to be a part of the certification. The lack of marketing materials was evident. Of the approved businesses we visited, which included those we interviewed as well as those we encountered as pedestrians, only four of them had HEM branding in their stores and/or products. When they did have branding, it was either the icon with the name of the certification, or just the icon. To the tourist, the certification's name means very little, so a marketing that explains the values behind the certification is necessary. Case in point, none of the food sector businesses we interviewed that had not previously applied to the HEM certification had heard of it or its purpose, despite being in the heart of Monteverde. Even businesses we interviewed that we felt embodied HEM's values had no idea the certification existed. These are huge, missed opportunities for HEM to expand its reach. In a way, our investigation contributed to spreading the word about the certification as well as keeping certified businesses on the loop about the certification.

When the investigation started, we had the view that the primary obstacle of this certification would be establishing objectivity and credibility in the assessment. However, objectivity and credibility could become obsolete if the certification does not prioritize growth. There is significant demand for the existence of this certification, but its success relies on people knowing of its existence.

4.2.3 The need for accessibility and education

Another significant threat to the certification had to do with the accessibility of the application and the level of education and awareness about sustainability of local businesses. These factors could potentially affect the number of applicants to the certification and ultimately the impact HEM can have on fostering circular and orange ideals in Monteverde.

There was significant difficulty in filling out the application. Many businesses reported that they had trouble completing it because of two main reasons: lack of access to technology and difficulty in understanding criteria. The application, made through a Google Form, had to be completed using a computer, which many businesses did not have. Additionally, businesses reported not understanding the wording of the criteria because it was too technical and there were no visual aids, templates, or suggested evidence types. Because of this, most interviewed applicants reported needing to ask for help to complete the HEM application. Since there were no designated HEM helpers, the format and language of the application acted as a barrier for applicants. This unfairly hindered the prospects of smaller businesses that lacked the resources or experience needed for using and understanding the certification.

It became evident that there was a lot of variability between sectors but also within them. The HEM certification is particularly tailored to more established local businesses, which left smaller businesses frustrated when they could not meet required criteria (D. Vargas, personal communication, January 26, 2023). A lot of businesses in Monteverde are informalized, which means that they could not meet the criteria to be approved. Some small businesses interviewed believed there was a bias towards big businesses. One applicant said that "the small producer cannot participate in HEM even if they have an excellent product, [the certification] is made for the big ones." Within the food sector, there were differences in accessibility based on business type. Restaurants and food shops were up to date on regulations and knew how to respond to HEM's criteria, while at-home operations that did deliveries or sold products struggled. As part of furthering HEM's goal of fomenting circular and orange economies, the certification should find a way expand opportunities for small businesses to grow even if they cannot be certified.

Aside from the accessibility of the certification, many businesses lacked the education and awareness necessary to partake in the certification. It was clear from the responses provided by businesses to the sustainability criteria that many did not expect the level of technicality that is involved in certifications. When we interviewed food sector businesses, many did not know the practices they could use to become more sustainable. Without the knowledge of how to improve, businesses remained stuck in their ways. The fact that many local businesses are unaware of how they can affect the environment around them limits the number of businesses that HEM can certify. Since HEM seeks to promote more sustainable practices in Monteverde, it should also provide local businesses with the tools and information necessary to instill change.

4.2.4 Objectivity and accuracy can only exist to a certain extent

An effective certification process is relative (rather than absolute) and objective (rather than subjective). It understands that there is variability in applicant businesses but rewards them points fairly. It is a difficult task to construct criteria that are not overly specific but can mold themselves to each applying business. This is why we focused on the three guiding principles of measurability, feasibility, and relevance when crafting the revised criteria. In HEM's application and assessment, there are areas of objectivity and accuracy that can be improved while there are others that cannot (at this time or anytime) due to the nature and limitations of a certification approach.

HEM's objectivity in the assessment of criteria was significantly affected by a lack of set standards and tolerances corresponding to each criterion. As a result, the scoring system was flawed. It gave no points for noncompliance, five points for compliance in progress, and ten points for compliance without defining what constitutes compliance. Since the criteria were unspecific and lacked means of quantification, compliance was impossible to define. For example, one criterion asked if the business was reducing the use of fossil fuels. Not by how much, not how, not over what time frame. Without guidelines that define compliance, the auditor was left to define the metric themselves, leading to a subjective evaluation of the applicant. Of course, there still needs to be flexibility – relativity – in the expectations from different businesses. For example, the certification cannot expect a large-scale restaurant to use the same amount of fossil fuels as an at-home operation. But both should make efforts appropriate to their abilities.

Furthermore, there were inconsistencies in the assessment of the application. At times, points allotted for similar answers varied. This was especially apparent in responses of "does not apply." For such an answer, some businesses received full points, others half points, and others none. If, in fact, the criterion does not apply to a business, its scoring should not affect the business's chances of approval positively or negatively. The criterion should not be considered, and the maximum number of points available to the business should be reduced to reflect the irrelevance of those criteria in assessing the applicant's sustainability. Furthermore, when constructing the table of **Appendix A**, we found that in multiple instances, the evidence type listed in HEM's records was "seen during inspection." If the evidence was "seen during inspection," one would expect a detailed record of what the auditor saw that led to a decision about compliance levels. Yet, there was no such record. For HEM to conduct a credible assessment, these observations need to be recorded.

A certain degree of objectivity and relativity can be expected in the creation of standards and tolerances. However, there are limits to the measurability and feasibility of criteria to provide a completely accurate assessment. These limits are not reserved for HEM but apply to certifications in general. HEM is undertaking a very complex task, and even though there is a good vision for creating criteria that are more measurable, feasible, and relevant, the reality – the operationalizing, measuring, evaluating – is very hard to tackle. Going back to the example of measuring the reduction of fossil fuels, we can think of measuring this criterion in three ways: by business size/type, by customer, or by unit of production. A small business will generally not have the same carbon footprint as a larger one. But, similarly, two businesses of the same size will not have the same carbon footprint if they have a different number of customers, produce a

different number of products, or produce different products. There is simply enormous variability. At the same time, even if it is possible to measure the use of fossil fuels, a truly accurate conclusion could be exhaustive in terms of time and effort. It would be possible for a restaurant to report how much gasoline its vehicle uses monthly, but it would be almost impossible to calculate how many fossil fuels are spent in the transportation of all its ingredients from the place of production to their destination. True impact eludes feasible quantification.

Furthermore, the more we researched, the more we realized how difficult it was to measure to what degree businesses address HEM's areas of concern through circular and orange values. This can also be said of certifications and their goals in general. The limitation causes a lot of contradictions as to who can be certified. For example, a vegan restaurant that is not mindful of the water use would not be certified under these criteria, while a business that offers meat products and uses water sparingly could be certified despite having a much higher indirect water footprint. A second example could be that having inefficient appliances uses more energy but replacing them with new ones while within their operational lifecycle has more impact in terms of energy and materials of production. It becomes clear that HEM cannot feasibly analyze food sector businesses in this manner, because the relativity is overwhelming, unquantifiable, and abstract. This is a question about certifications (and many other measures of sustainability) that remains.

5. Recommendations

As a result of our investigation, findings, and discussion, we have identified a set of recommendations that would serve HEM's goals and purpose. First, we develop recommendations for the continuation of the work we started, the improvement of the application. This will be divided into how to continue to improve the application for food sector businesses and how to carry out the same process of improvement in the other business sectors. Then, we will discuss ways in which the application could be made more accessible. Last, we will discuss ways in which HEM could better their marketing and outreach.

5.1 Establish points, standards, and tolerances for food sector sustainability criteria

As was evidenced in our results and discussion sections, the HEM application has insufficient objectivity. If HEM is to become a well-known certification, its assessment needs more rigor and credibility. To address this, our first recommendation to HEM is to assign points to the criteria based on their impact on environmental sustainability in Monteverde. In order to do this, we suggest that the organization review the full findings of Objective 2 (Identify and understand practices of sustainability in Monteverde food sector businesses) and consult about which sustainability concerns are the most important to the people of Monteverde and Monteverde itself. Then, points should be accordingly allocated to each of the 23 new criteria. Additionally, we suggest that items that ask for a plan (for waste management, water consumption, fossil fuel use, electricity use, etc.), as well as those asking for the applicants' participation in the community be required for approval. This system will allow for a more accurate assessment of the food sector's impact on environmental sustainability and of their alignment with HEM's goals.

After the criteria have been weighed, we recommend that HEM create standards and tolerances for the scoring of each criterion. The standards should be reflective of the number of points that were allocated to the criterion. For example, if the criterion is worth 4 points, there should be a standard set for what level of compliance receives 0, 1, 2, 3, and 4 points. Then, for each standard, a tolerance must be set. When possible, we recommend HEM to use quantitative lower and upper limits. Equations can be created to add variability to these ranges based on specificities of the business (e.g., business size, number of customers, etc.). For example, for energy use, it could be that a business needs to use under 1 kWh/customer for 4/4 points and under 1.25 kWh/customer for 3/4 points. However, quantification is not feasible for all criteria since many do not have numerical bounds. We suggest that HEM meet with experts (especially auditors) and review other certifications to help determine what the standards and tolerances should be. Overall, this will allow for easier measurability and more objectivity in assessment.

Third, we recommend HEM to run pilot tests with the updated criteria and scoring system and make any revisions if needed. The pilot tests serve two main purposes: one is to make sure the new scoring system is well balanced and neither too lenient or too strict, the other is to see how the measurability, feasibility, and relevance have changed from the old criteria. We recommend that some of the pilot tests be done with food businesses that previously applied to allow a direct comparison. These three steps will finalize the task of improving the sustainability criteria for food sector businesses.

5.2 Revise criteria for other business sectors and areas of concern

Our project focused on just one of six business sectors (lodging, food, service/guides, agriculture, artisans, and wellness) and one of three areas of concern (sustainability, society, and origin) identified by

HEM. As future steps, we recommend HEM to guide their improvement of all business sectors' applications using the process we outlined in this paper. We suggest that they begin using a similar method as outlined in Objective 2 (identify and understand practices of sustainability in Monteverde food sector businesses) to understand the specifics of the intersection between a business sector and an area of concern. Then, phase 2 of our methodology (develop improved sustainability criteria for food sector businesses) can be implemented. Last, the general suggestions made about establishing points, standards, and tolerances, as well as conducting pilot tests, can be used for the rest of the applications. We recommend that HEM begin with the sustainability criteria of the rest of the applications since our criteria can be easily modified to reflect the realities of different sectors. A breakdown of recommended steps is shown below:

1. Review literature about the intersection of the sector and the area of concern.
2. Review similar certifications and categorize similar criteria.
3. Interview businesses in the sector and ask specific questions about their impacts.
4. Draft indicators and criteria based on the findings of steps 1-3.
5. Seek feedback from auditors and stakeholders and polish criteria.
6. With the help of experts and the HEM community, set points, standards, and tolerances for each criterion.
7. Conduct pilot tests and revise the criteria further if necessary.
8. Use for future rounds of applications!

5.3 Improve the accessibility of the certification

There were multiple barriers for applicants hoping to fill out the application. These can be broadly categorized into a lack of education/training, a lack of access to technology, and difficulty meeting requirements. Addressing these three barriers can significantly enhance the impact that HEM has on the Monteverde community, so we recommend the following steps be taken.

Our findings showed that several businesses were unsure of what the criteria asked for or what acceptable practices would look like. For HEM to fulfill its goals for Monteverde, it needs to better spread its message. As part of the recruitment of applicant businesses, we recommend HEM to hold annual meetings open to all residents where the organization presents its goals and gives guidance to businesses hoping to align themselves with HEM. Additionally, we suggest they hold specific training courses about topics (for example, water conservation) and provide resources for improvement. This can be done in conjunction with other local organizations, such as Corclima. We believe that holding these meetings and showing what compliance with HEM's standards can look like will create an impactful community space. Prospective applicants can learn more about what practices they can implement in their businesses to serve Monteverde better, and the network can collaborate and help each other. Then, once these better practices are put in motion, the businesses can apply to HEM with more preparation and understanding of expectations.

In order to address the lack of technological accessibility that was evident in applicants, we recommend HEM to establish a "buddy" system. Applicant businesses can be paired with certified businesses and HEM representatives to facilitate the application process. It should be ensured that either the business or the buddy has access to a computer and a camera that can be used for filling the application and providing digital evidence. Moreover, buddies should be knowledgeable of the application and the criteria in order to facilitate the process and reduce frustration. It is important that evaluators – like the auditor – do not participate as buddies, since they should not be a part of the collection of evidence and the judges of it, too. The downside of this recommendation is that participating as a buddy would likely take up time and effort, and HEM might consider hiring a few helpers that can devote their full time to this.

The third barrier to certification was that some businesses were automatically removed from consideration because they did not meet specific requirements of the application. The requirement that caused this elimination most often asked for the business to be formalized, which is a reasonable expectation. There are several businesses in Monteverde that do not make enough profits to warrant formalization, and they expressed feeling excluded from HEM. Because HEM's goals are to foster the circular and orange economies of the region, we suggest that they make some changes in order to include smaller businesses. We envision this through the creation of a product certification. This would allow unformalized businesses to certify specific products that are in accordance with HEM's values without having to certify their whole business. Additionally, this would help small businesses grow to a point where they could become formalized and apply to be certified.

5.4 Improve marketing and outreach approaches

Our last set of recommendations serves to grow HEM as an organization in Monteverde. For a certification to be successful, it needs to be known. Importantly, it needs to be known both by prospective local businesses and consumers. For this, we recommend HEM to create more opportunities for the marketing and outreach of its program.

For the prospective businesses, we think that the annual meetings and training detailed in the previous section could be an effective method of garnering interest in joining. Furthermore, HEM could partner with other local organizations and reach out to their base. Furthermore, when asked, many previous applicants said they would recommend the certification once they started noticing its benefits, so increasing the marketing for consumers would also indirectly increase appeal for business owners. Additionally, we believe that the new criteria will give the certification more structure and credibility, which will increase likelihood of businesses applying.

In terms of consumers, HEM needs to target the certification to both tourists and locals. For this, we recommend that they create marketing materials both in Spanish and English that give a bit of insight as to what the organization certifies. As of now, marketing materials only include the name of the certification and its logo, which mean very little without context. We recommend the inclusion of information about HEM's goals, values, and areas of concern. Additionally, it would be useful to provide certified businesses with signs that detail the impact they have on Monteverde's society and environment. Some ideas for methods of marketing include ads on websites, large signs on the roads, more stamps on certified products, stickers, bumper stickers, merchandise, pamphlets, etc. All of this would spread the word of HEM and create a lasting impact on the Monteverde community.

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Appendices

Appendix A – Sustainability criteria score analysis for previous applicants

The table below contains information about the scoring of sustainability criteria for business applicants. Specifically, the left two columns of the table number each of thirty-three business applicants and their business sectors. The top row lists eight environmental sustainability criteria from the application. Each colored cell indicates the type of evidence recorded for the eight criteria for each business's application. The color key (immediately below right) indicates the number of points (0, 5, 10) that can be awarded to each business for each criterion and the level of compliance with standards (does not comply, partial compliance, complies). The right two columns of the table record two final scores. The first column contains the averages of the eight environmental sustainability criteria scores expressed as a percent.

Key

Points	Compliance to criterion
0/10	Does not comply
5/10	Partial compliance
10/10	Complies

Sustainability criteria evidence and scores for previous applicants

Business	Business sector	1. Waste management plan	2. Material reutilization and reduction of waste	3. Wastewater treatment	4. Reduction in water consumption	4. Reduction of fossil fuel use	5. Clean energy and reduction of electricity use	7. Biodiversity and ecosystem protection	8. Awareness about biodiversity and energy efficiency	Environmental sustainability criteria score (%)
1	Food	None	None	None	None	None	None	None	None	0
2	Food	None	Inspection	Inspection	None	None	Use natural light during the day	None	Inspection	38
3	Food	None	Inspection	Inspection	N/A	Use induction stove	N/A	None	None	56
4	Food	Plan of the commercial center it is a part of	Picture of product packaging	Residual water chemical analysis	Inspection	N/A	Inspection	None	Picture of paper bags with logo	63
5	Food	Summary of objectives	None	None	None	None	Solar panels	None	Picture of a class promoting sustainability	63
6	Food	N/A	Comport and reutilization of materials	Septic tanks and wastewater garden	Want to have a rainwater collection system to wash solids	N/A	Efficient light bulbs	No plastic bags, they participate in trash collection initiatives	Promote plant-based diets to reduce ecological impacts, promotes local consumption	75
7	Food	N/A	Reutilization program with providers and consumers	N/A	N/A	Optimization of delivery routes	N/A	Working to be more involved	Have the initiative but have not been able to implement it due to Covid	75
8	Arts	None	None	None	None	None	None	None	None	0
9	Tourism/ experiences	None	None	None	None	None	None	None	None	0
10	Tourism/ experiences	None	Inspection	Inspection	None	None	Use natural light	Picture of garden, local food production	None	31
11	Arts	None	Picture of wires	None	Inspection	N/A	Inspection	None	None	38
12	Arts	No comprehensive waste plan but produces little waste and wants to work on it	Recycles silver for jewelry, uses paper/carboard for packaging, uses compost in local farm	Inspection; the space is rented and therefore cannot make big changes	Does not have access to water usage levels	Very little gas usage and utilizes public transportation or walks whenever possible	Uses headquarters as an office and living quarters, LED light bulbs	None	Dedicated to recycling and reducing carbon impact, but has no tangible plan	44

13	Arts	None	Pictures of products made with reused materials and recycled packaging	Inspection	Inspection	Inspection	Sensor on outlet	None	Picture of products	50
14	Tourism/ experiences	None	Inspection	Inspection	Inspection	None	Inspection	Inspection	Inspection	56
15	Welfare	None	Virtual inspection	Septic tank	Virtual inspection	Virtual inspection	Virtual inspection	Picture of garden	Certificate	63
16	Arts	None	Reused materials for manufacturing, paper packaging	Inspection	Inspection	None	Inspection	Picture of yellow flower	Paintings, promotion of local initiatives	63
17	Tourism/ experiences	Virtual inspection	Virtual inspection	Virtual inspection	Virtual inspection	None	Virtual inspection	None	None	63
18	Welfare	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63
19	Arts	N/A	Reused materials for manufacturing	N/A	Minimal water consumption	N/A	Implementation of energy saving lightbulbs	Reutilization of materials	None	69
20	Arts	N/A	Uses recycled waste to make products	Minimal water usage	Minimal water consumption	N/A	Products are made with clean energy, but there is transportation	Picture of conserved land	Picture of garden	69
21	Tourism/ experiences	Inspection	Inspection	Inspection	Inspection	Inspection	Inspection	None	Inspection	69
22	Arts	Inspection	None	Inspection	Inspection	Inspection	Inspection	Inspection	None	69
23	Arts	Virtual inspection	They exchange unused materials with La Tilichera	Septic tanks for grey and black water	They use minimal water	Virtual inspection	Natural light during day, energy efficient lights	They volunteer in the community for things like reforestation and the Monteverde Institute	They are committed to collaborating to improve the environment	69
24	Tourism/ experiences	Inspection	Compost and recycling	Inspection	Denied access	Electric car charging ports	Attempts to cut electricity bill	Offers tours and classes to strengthen these ideals, conducts a forest cleanup, plants species	Creates captions to promote sustainability	69
25	Tourism/ experiences	Inspection	None	Inspection	Inspection	None	Inspection	Inspection	Inspection	69
26	Services	Virtual inspection	Virtual inspection	Virtual inspection	Virtual inspection	None	Virtual inspection	Climate action plan	None	75
27	Tourism/ experiences	Virtual inspection	None	Virtual inspection	Virtual inspection	None	Virtual inspection	Makes an effort towards reforestation shown on Instagram	Has a YouTube channel about nature	75
28	Arts	Plan exists but has further steps needed	Pictures of products made with reused materials	Map of grey water system	Spreadsheet with monthly water usage	Inspection	Spreadsheet with monthly energy spending	Pictures of biodiversity conservation on the grounds	None	81
29	Arts	N/A	Picture of volunteering with waste	Virtual inspection	Virtual inspection	N/A	Picture of equipment	None	Picture of tote bag with logo	81
30	Arts	N/A	Uses recycled materials for many products	Works in own house, reports adequate wastewater	Reduces water pressure, pays fixed rate for water each month	N/A	Heats house/workshop with natural light	Collection and use of waste/recycled materials	Works to reduce and recycle, as well as spread awareness	81
31	Welfare	They recycle/reuse waste	They do a lot of things to recycle/reuse waste	Have multiple septic tanks	Have a plan to keep their water use low	Have solar panels and solar powered water heater	Have solar panels on the roof for around 50% of their energy	Volunteered with the Monteverde Institute for reforestation	None	88
32	Tourism/ experiences	None	Inspection	Inspection	N/A	N/A	N/A	Inspection	Inspection	88
33	Lodging	Have an action plan	They compost/recycle and donate lids	Have eight systems for dealing with waste	Shows decrease in water use	Shows decrease in diesel and natural gas and increase in gas	Shows reduction in energy	Volunteered with the Monteverde Institute for reforestation	Have completed and continue to participate in training programs to be more sustainable	100

Appendix B – Applicant interview preamble and consent

The preamble below informs the applicant interviewee of their rights and requests their consent to be interviewed. The first part of the preamble contains a brief background of the project and important information regarding the interview. The second part of the preamble states that the interviewee has the right not to respond and that all responses made by the interviewee will be anonymous, confidential, and used for the report and presentation.

Applicant interview preamble

Hello, thank you so much for agreeing to meet with us. As you may recall, our project goal is to improve the criteria regarding the Hecho en Monteverde certification. We are interested in your honest thoughts about the certification.

As a quick background, we're a team of students from an engineering university, WPI, in Massachusetts, and we are completing a requirement for our degrees. Our names are Paige Campagna, Sol Giesso, Patrick King, and Cameron McAfee.

This interview will take around forty-five to sixty minutes. In the course of your responses know that your replies will remain anonymous and confidential. In addition, should we ask you a question that you do not wish to answer, that's fine. If you want to contact us after the interview, you have our contact information. To make it easier to keep track of the interview we wish to record the audio of the conversation; is that ok with you or would you not prefer a recording? In either case we will take notes of your responses.

In the end, the information in this interview will be used for our report and presentation that will ideally help improve the HEM system. Here is some more information including our contact information. Otherwise, is it okay to get started?

Appendix C – Applicant interview questions

The table below contains interview questions for businesses that applied to HEM's first round of certifications. The first column numbers each of the thirteen interview questions. The second column contains the focus of each question (the applicant's perspective of the application, their experience filling it out, and the perceived impacts of the application). The third and fourth columns contain interview questions and their Spanish translations.

Semi-structured interview questions
Population sampled: Businesses that applied to HEM's first round of certifications

#	Focus	Question	Spanish translation
1	Determine the applicant's perspective on the certification program application	Why did you apply for the certification? What do you think are its benefits?	¿Por qué aplicó para esta certificación? ¿Cuáles cree que son sus beneficios?
2		How did you feel while filling out the application?	¿Cómo se sintió al llenar la aplicación?
3		Do you think that the criteria accurately represent your values as a business? Why or why not?	¿Le pareció que los criterios representan sus valores como negocio? ¿Por qué?
4		What are your values as a business and as a part of Monteverde?	¿Cuáles son sus valores cómo negocio y como parte de Monteverde?
5	Determine the applicant's experience with the certification program application	How long did it take you to fill the application out?	¿Cuánto tiempo demoró en llenar el formulario?
6		Did you have to ask for help to fill out the application? Was the format easy to comprehend?	¿Tuvo que pedir ayuda para llenar la aplicación? ¿Fue fácil de usar el formato?
7		Are there any questions you would add to the application? Why?	¿Hay preguntas en el cuestionario que agregaría? ¿Por qué?
8		Are there any questions you would take away from the application? Why?	¿Hay preguntas que le restaría a la aplicación? ¿Por qué?
9		What would you change about the application? What would you keep the same?	¿Qué cambiaría sobre la aplicación? ¿Qué mantendría igual?
10	Determine the perceived impacts of the certification on the business	Were you approved to be certified? If not, do you know why?	¿Fue aprobada la certificación para su emprendimiento? Si no, ¿sabe por qué?
11		What benefits have you noticed as a result of your HEM certification, if any? Follow up quantitatively.	¿Qué beneficios ha tenido desde obtener su certificación de HEM? Follow up quantitatively.
12		What negative effects has the certification had, if any?	¿Qué efectos negativos ha tenido la certificación?
13		On a scale from 1 to 10 (1 being least likely and 10 being most likely) Would you recommend this certification to other businesses?	Del 1 al 10 (el 1 siendo poco probable y el 10 muy probable), ¿le recomendaría esta certificación a otros negocios?

Appendix D – Food sector businesses interview preamble and consent

The preamble below informs the food sector applicant interviewee of their rights and requests their consent to be interviewed. The first part of the preamble contains a brief background of the project and important information regarding the interview. The second part of the preamble states that the interviewee has the right not to respond and that all responses made by the interviewee will be anonymous, confidential, and used for the report and presentation.

Food sector applicant interview preamble

Hello, thank you so much for agreeing to meet with us. As you may recall, our project goal is to improve the criteria regarding the Hecho en Monteverde certification. We are interested in learning about your practices as a food sector business.

As a quick background, we're a team of students from an engineering university, WPI, in Massachusetts, and we are completing a requirement for our degrees. Our names are Paige Campagna, Sol Giesso, Patrick King, and Cameron McAfee.

This interview will take around forty-five to sixty minutes. In the course of your responses know that your replies will remain anonymous and confidential. In addition, should we ask you a question that you do not wish to answer, that's fine. If you want to contact us after the interview, you have our contact information. To make it easier to keep track of the interview we wish to record the audio of the conversation; is that ok with you or would you not prefer a recording? In either case we will take notes of your responses.

In the end, the information in this interview will be used for our report and presentation that will ideally help improve the HEM system. Here is some more information including our contact information. Otherwise, is it okay to get started?

Appendix E – Food sector businesses interview questions

The table below contains interview questions for food sector businesses. The first column numbers the twenty-seven questions. The second column contains the focus of each question. The third and fourth columns contain the interview questions and their Spanish translations. The focus of the first eleven questions determines the food sector business's a) knowledge of HEM and thoughts about certifications, b) its values and priorities, c) how it is environmentally sustainable, and d) its size. Questions eleven through twenty-six relate to the five environmental sustainability categories: waste (purple), water (blue), energy (orange), biodiversity/conservation (green), and awareness/action (red).

Semi-structured interview questions
Population sampled: Monteverde businesses in the food sector

#	Focus	Question	Spanish translation
1	Determine the business's knowledge of HEM and thoughts about certifications	Have you heard of HEM's certification program? If so, would you want to apply?	¿Ha escuchado sobre el programa de certificación de HEM? Si sí, ¿por qué o por qué no aplicaría?
2		What would you want out of a certification program?	¿Qué resultados busca en un programa de certificación?
3	Determine the businesses values and priorities	What are the core values of your business?	¿Cuáles son sus valores como negocio?
4	Determine how food sector businesses (food service and food preparation) are environmentally sustainable	Where lies the biggest environmental impact of your business?	¿Cuál cree usted es el mayor impacto de su negocio al medio ambiente?
5		Where do you see opportunities for environmental improvement in your business? Ask for specifics.	¿Qué cambios ha realizado para mejorar la sostenibilidad de su emprendimiento? ¿Qué cambios podría realizar? Ask for specifics.
6		Where do you think there are little to no opportunities for environmental improvement in your business? Ask for specifics.	¿Dónde cree que no hay más oportunidades para mejorar? Ask for specifics.
7		Do any of your products and/or services come from outside Monteverde? If so, how many and what are they? What do you think about local ingredients?	¿Ofrece productos o servicios que vienen de afuera de Monteverde? Si sí, ¿cuántos y cuáles? Qué piensa sobre usar ingredientes locales?
8		Have any auditors done an assessment of your business? If so, what advice did they give you? How did you contact these auditors?	¿Hizo alguna inspección de su negocio? Si sí, ¿qué le recomendaron? ¿Cómo contactó a los inspectores?
9	Gauge the business's size	What is the size of your business in square meters?	¿De qué tamaño es su negocio en metros cuadrados?
10		Do you track how many customers you have on average per month? How many is that?	¿Sabe cuántos clientes tiene al mes?
11	Determine the business's measurable impact on waste	Do you measure waste? How? How frequently?	¿Mide sus desechos? ¿Cómo? ¿Con qué frecuencia?
12		Do you know what percentage of waste generated belongs to each waste category (organic, plastic, paper/cardboard, glass, etc.)?	¿Sabe qué porcentaje de sus residuos pertenecen a cada categoría?
13		What do you do to recycle or reuse waste? Do you measure how much waste you recycled? How do you measure this?	¿Cómo recicla o reusa residuos? ¿Mide estos residuos reciclados? ¿Cómo?
14	Determine the business's measurable impact on water	Do you measure water usage? How? How frequently?	¿Cómo mide su consumo de agua? ¿Con qué frecuencia?
15		What are your biggest uses of water?	¿Cuál es su mayor consumo de agua?
16		Do you make any efforts to conserve water? If so, what are they?	¿Toma alguna medida para conservar el agua? ¿Cuales?
17		Do you have adequate wastewater systems?	¿Trata sus aguas grises y negras?
18	Determine the business's measurable impact on energy	Do you measure energy? How? How frequently?	¿Cómo mide su uso de energía? ¿Con qué frecuencia?
19		What is your baseline power usage kWh?	¿Cuántos kWh usa en promedio?
20		What kind of appliances do you use and are they energy efficient? How is your kitchen laid out?	¿Qué tipo de electrodomésticos usa? Son eficientes? ¿Cómo está distribuída su cocina?
21		How often do you perform maintenance or ensure appliances are performing as expected?	¿Con qué frecuencia hace mantenimientos de sus electrodomésticos y aparatos?

22	Determine the business's measurable impact on biodiversity/conservation	Do you measure your impact on biodiversity? What is it? How do you measure this?	Qué impactos tiene sobre la biodiversidad? Los mide? Cómo?
23		Do you measure your impact on land conservation? What is it? How do you measure this?	¿Qué impactos tiene en la conservación de tierras? Los mide? Como?
24	Determine the business's measurable impact on awareness/action	Do you spread awareness to inspire the community to participate in environmentally sustainable practices? How?	¿Concientiza a la comunidad para que participe en prácticas sostenibles? ¿Cómo?
25		Have you created and implemented any policies regarding environmental sustainability? What are they?	¿Creó o implementó reglamentos hacia la sostenibilidad? ¿Cuáles?
26		Have you made efforts to train your stakeholders (including collaborators, clients, suppliers and/or the community) about environmental sustainability? How?	¿Hace esfuerzos para entrenar a colaboradores, clientes, proveedores y/o la comunidad sobre la sostenibilidad ambiental? ¿Como?

Appendix F – Suggestions from auditor on revised criteria and indicators

The table below contains the HEM auditor's suggestions on revised criteria and their indicators. The left column contains the eight environmental sustainability criteria from the original application. The two middle columns contain the proposed criteria and their indicators. The right column contains the HEM auditor's suggestions on the proposed criteria and indicators.

Suggestions from HEM auditor on revised criteria and indicators

Original criteria	Drafted criteria	Drafted indicators	Auditor feedback
1. The organization has designed, delivered and executed a comprehensive waste management plan in accordance with the requirements of Law No. 8839: Law for comprehensive waste management.	1. The organization properly separates and treats waste in the following categories: reusable, recyclable (glass, aluminum, plastic, paper), compostable, hazardous, and disposable.	Separation of waste, treatment of hazardous waste, adequate containers.	Change language to match Regulation 8839, ensure language reflects full cycle of the product, ask for the regulation's template as evidence, evidence of accomplishment of the plan, ask for receipts/corroboration of taking the waste to the management centers.
	2. The organization measures and tracks its waste, as well as develops and adheres to a plan for waste management.	Tracking waste generation, existence of plans to reduce generation.	Ask for a registry of measurements of waste.
2. The organization reuses materials and minimizes waste in the complete cycle of the product or service offered.	3. The organization uses biodegradable, recycled, and recyclable materials whenever possible.	Usage of recyclable or biodegradable materials, separation of waste, recycling and repurposing materials, composting.	Add specifics about what these should be (biodegradable should be degradable in 28 days, 65-70%), ask for scientific/technical documents that certify this.
	4. The organization minimizes waste in the complete cycle of the product offered.	Measurement of waste, minimization of material (especially plastic) use, usage of all parts of ingredients.	No comment.
	5. The organization has developed and adheres to an annual plan to reduce waste production.	Plan to minimize waste, proper waste disposal.	No comment.
3. The organization treats its gray and black water through a bio-gardener, septic tank or another that ensures efficient treatment. Likewise, in the case of reusing wastewater, it complies with the legal requirements of Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater.	6. Wastewater, including gray and black water, is appropriately treated and discharged per Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater.	Presence of separate septic tanks, control of wastewater generation, soil contamination levels, water body contamination levels, groundwater contamination levels, wastewater contamination levels at discharge, tracking wastewater generation, existence of plans to reduce consumption.	Include the new Regulation No. 42075 about filtering water, which many businesses do not comply with.
	7. The organization reuses or repurposes wastewater whenever possible.	Wastewater garden.	No comment.

4. The organization reduces the annual consumption of water per person or per unit of production.	8. The organization monitors metrics of water usage. The organization calculates water usage per person or unit of production.	Bills and receipts of water consumption.	No comment.
	9. The organization has developed and adheres to a plan that decreases water consumption and maximizes efficiency of water usage.	Efforts/plan to reduce water usage, maximization of water usage (ex. full loads of dishes).	Add more common examples of maximization of water usage.
	10. The organization utilizes water efficient appliances.	Usage of water-efficient appliances, prevention of leaks.	No comment .
5. The organization reduces the use of fossil fuels: gasoline, diesel, bunker, liquefied petroleum gas. In the case of not consuming fossil fuels, select "Other," specify that you do not consume these and answer question 2.04 about electricity consumption.	11. The organization monitors metrics of fossil fuel usage and utilizes renewable energy when possible.	Bills and receipts of fossil fuel usage, periodical energy audits.	Focus on reducing usage.
	12. The organization has designed and adheres to an annual fossil fuel usage plan that weans carbon dioxide and other greenhouse gas emissions.	Offsetting efforts, heating systems, energy efficient appliances, maintenance of appliances, existence of plans to reduce consumption.	Focus on reducing usage, look at the Costa Rican decarbonization plan.
	13. The organization promotes cleaner alternative methods of transportation.	Transportation methods, usage of local ingredients.	Include using alternative routes, carpooling, etc.
6. The organization uses clean energy and reduces electricity consumption.	14. The organization monitors metrics of electricity consumption and performs periodic energy audits of the business.	Electricity bills, energy audits.	No comment.
	15. The organization incorporates energy efficient appliances, lighting, and kitchen layout (if applicable). Periodic maintenance is performed on appliances and equipment to ensure their efficiency.	Kitchen layout, energy-efficient appliances, energy-efficient lighting, availability of natural light, routine maintenance of appliances.	Efficient appliances might come with an inventory and transition period.
	16. The organization has developed and adheres to a plan that minimizes electricity consumption and aims to get electricity from cleaner sources.	Presence of on-site renewable energy generation, existence of plans to reduce consumption.	On-site electricity generation is not the best option because the matrix is already 95% clean and there are problems with disposal.
7. Actively develops and/or participates in activities that seek to protect biodiversity and increase the natural habitats and ecosystems in the area.	17. The organization tracks and makes an effort to source ingredients from sustainably certified, non-GMO, organic, or local suppliers. The organization does not include any threatened or invasive species in its products.	Wide variety of species of fruits and vegetables, non-GMO ingredients, organic ingredients, biodiversity-friendly certified ingredients.	Add non-monoculture ingredients, could also include no Coca-Cola or similar product.
	18. The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and fertilizers on its grounds.	Planting native species, no threatened or invasive species on the menu.	Add no feeding animals.

8. The organization demonstrates efforts to train/sensitize its stakeholders: collaborators, clients, suppliers and/or the community on issues associated with sustainable development, biodiversity, conservation and efficient production.	19. The organization has developed sustainability policies and trains its staff to follow them.	Plan to educate employees on conservation.	No comment.
	20. The organization educates its staff, customers, collaborators, and the community about environmental sustainability.	Advertisement of values to customers, signs or regulations about sustainability in the business, posters, certifications on dishes/products.	No comment.
	21. The organization actively participates and encourages others to participate in sustainability practices and initiatives that reflect the values of HEM.	Donations, hosting community events about sustainability, collaboration with exterior sustainability organizations.	Add criterion about suppliers (an overview of sustainability can be done with just looking at providers).

Appendix G – Suggestions from the HEM board and organizations on revised criteria and indicators

The table below contains suggestions from the HEM board and organizations on drafted criteria and their indicators. The left two columns contain the third drafts (drafted using the auditor's suggestions in Appendix J) of the environmental sustainability criteria and their indicators. The middle column contains suggestions from the HEM board and organizations on the drafts of the environmental sustainability criteria and their indicators. The right two columns contain the final drafts (drafted using suggestions from the HEM board and organizations) of the criteria and their indicators.

Suggestions from HEM and organizations on revised criteria and indicators

Revised criteria with auditor's comments	Revised indicators with auditor's comments	Comments from HEM and organizations	Final criteria	Final indicators
1. The organization properly separates and treats waste in the following categories: ordinary (separated into glass, packaging, paper and cardboard, and organic), hazardous, and special treatment.	Separation of waste, treatment of hazardous waste, adequate containers.	Be explicit about refrigerants and the management of refrigerant gases.	1. The organization properly separates and treats waste in the following categories: ordinary (separated into glass, packaging, paper and cardboard, and organic), hazardous, and special treatment.	Separation of waste, treatment of hazardous waste, treatment of special treatment waste (including batteries and refrigerants), adequate containers.
2. The organization measures and tracks its waste, as well as develops and adheres to a comprehensive plan for waste management in accordance with the requirements of Law No. 8839.	Tracking waste generation, existence of plans to reduce generation, completion and adherence to Law No. 8839, evidence of compliance with Law No. 8839, full cycle waste plan for products, receipts from waste management centers.	Ask for businesses to weigh their trash. Ask for a plan for organic waste.	2. The organization weighs and tracks its waste, as well as develops and adheres to a comprehensive plan for waste management (including organic waste) in accordance with the requirements of Law No. 8839.	Tracking waste generation, existence of plans to reduce generation, completion and adherence to Law No. 8839, evidence of compliance with Law No. 8839, full cycle waste plan for products, receipts from waste management centers, specific plans for organic waste.
3. The organization uses biodegradable, recycled, and recyclable materials whenever possible.	Usage of recyclable or biodegradable materials, proof a biodegradable product (65-70% degradation in 28 days), separation of waste, recycling and repurposing materials, composting,	It's important where biodegradable products go, all need to be composted and many need extra processing. Add reused along with recycled.	3. The organization uses biodegradable, reused, recycled, and recyclable materials whenever possible.	Usage of recyclable or biodegradable materials, proof biodegradability (65-70% degradation in 28 days), separation of waste, recycling and repurposing materials, composting, proper handling of biodegradable and recyclable materials.
4. The organization minimizes waste in the complete cycle of the product offered.	Measurement of waste, minimization of material (especially plastic) use, usage of all parts of ingredients	Change "complete cycle" to "complete life cycle." Change minimization of material use to minimization of disposable products.	4. The organization minimizes waste in the complete life cycle of the product offered.	Measurement of waste, minimization of material use (especially plastic) use, reduction of disposable products, usage of all parts of ingredients.
5. The organization has developed and adheres to an annual plan to reduce waste production.	Plan to minimize waste, proper waste disposal, proof of adherence.	No comment	5. The organization has developed and adheres to an annual plan to reduce waste production.	Plan to minimize waste, proper waste disposal, proof of adherence.

6. Wastewater, including gray and black water, is appropriately filtered, treated, and discharged per Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater and Regulation No. 42075: Regulation for Groundwater Discharge of Treated Wastewaters.	Presence of separate septic tanks, control of wastewater generation, soil contamination levels, water body contamination levels, groundwater contamination levels, wastewater contamination levels at discharge, tracking wastewater generation, existence of plans to reduce consumption, filtration system of wastewater	Add installation of dry toilet and record of septic tank maintenance to indicators. Add ways to treat wastewater in parentheses. Change wording to include "when applicable." Ask for grease traps.	6. Wastewater, including gray and black water, is appropriately filtered, treated (through a septic tank, wastewater garden, or other), and discharged when applicable per Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater and Regulation No. 42075: Regulation for Groundwater Discharge of Treated Wastewaters.	Presence of separate septic tanks, installation of dry toilet, record of septic tank maintenance, grease traps, control of wastewater generation, soil contamination levels, water body contamination levels, groundwater contamination levels, wastewater contamination levels at discharge, tracking wastewater generation, existence of plans to reduce consumption, filtration system for wastewater.
7. The organization reuses or repurposes wastewater whenever possible.	Wastewater garden, recycling of useable wastewater	Be specific about using grey water for irrigation/watering plants. Add something about using products without harmful chemicals (for example, detergent).	7. The organization reuses or repurposes water whenever possible. The organization uses products without harmful or persistent chemicals.	Wastewater garden, recycling of useable wastewater, rainwater capture, use of grey water for irrigation, kinds of chemicals used in detergents and others.
8. The organization monitors metrics of water usage. The organization calculates water usage per person or unit of production.	Bills and receipts of water consumption, tracking of customers/products produced and their water consumption	Ask for a list of water sources the organization uses, since not everyone gets them only from the state. Add "month-to-month" wording.	8. The organization monitors metrics of water usage from all water sources utilized monthly. The organization calculates water usage per person or unit of production.	Bills and receipts of water consumption, presence of flow meters, tracking of customers/products produced and their water consumption.
9. The organization has developed and adheres to a plan that decreases water consumption and maximizes efficiency of water usage.	Efforts/plan to reduce water usage, maximization of water usage (ex. full loads of dishes, washing fruits and vegetables in bulk,	Add rainwater capture to indicators.	9. The organization has developed and adheres to a plan that decreases water consumption and maximizes efficiency of water usage.	Efforts/plan to reduce water usage, rainwater capture, maximization of water usage (ex. full loads of dishes, washing in bulk).
10. The organization utilizes water efficient appliances and/or has a plan to phase inefficient ones out following their life cycles.	Usage of water-efficient appliances, prevention of leaks.	Put dry composting toilets and low flush toilets as examples of water efficient appliances.	10. The organization utilizes water efficient appliances and/or has a plan to phase inefficient ones out following their life cycles.	Usage of water-efficient appliances (such as dry composting or low flush toilets), prevention of leaks.
11. The organization monitors metrics of fossil fuel usage, reduces usage, and utlizes renewable energy when possible.	Bills and receipts of fossil fuel purchases, periodical energy audits	Add examples of fossil fuels, especially liquid petroleum gas which is used in gas stoves.	11. The organization monitors metrics of fossil fuel (gasoline, diesel, bunker, liquefied petroleum gas, etc.) usage monthly, reduces usage, and utilizes renewable energy when possible.	Bills and receipts of fossil fuel purchases, periodical energy audits.
12. The organization has designed and adheres to an annual fossil fuel usage plan that reduces carbon dioxide and other greenhouse gas emissions.	Offsetting efforts, heating systems, energy efficient appliances, maintenance of appliances, existence of plans to reduce consumption.	Add water heating systems to indicators. Remove offsetting efforts from indicators.	12. The organization has designed and adheres to an annual fossil fuel usage plan that reduces carbon dioxide and other greenhouse gas emissions.	Efficient heating systems (including water heaters), energy efficient appliances, maintenance of appliances, existence of plans to reduce consumption, offsetting efforts.
13. The organization promotes cleaner methods of transportation, participates in collective transport, and/or increases efficiency in routes.	Transportation methods, usage of local ingredients, alternate routes, carpooling.	Give examples of cleaner means of transportation (walking, biking, collective transport) Change carpooling to collective transport. Replace alternative routes with using an electric vehicle or offering a charging station for electric vehicles.	13. The organization promotes cleaner methods of transportation (walking, biking, EVs), participates in collective transport, and/or increases efficiency in routes.	Transportation methods, usage of local ingredients, alternate routes, collective transport (carpooling, buses, shuttles, trains), EVs, offering EV charging stations.

14. The organization monitors metrics of electricity consumption and performs periodic energy audits of the business.	Electricity bills, energy audits.	Ask for a specific table of electricity consumption.	14. The organization monitors metrics of electricity consumption monthly and performs periodic energy audits of the business.	Electricity bills, energy audits, detailed records of electricity consumption.
15. The organization incorporates energy efficient appliances, lighting, and kitchen layout (if applicable), and/or has a plan to phase out inefficient ones following their life cycles. Periodic maintenance is performed on appliances and equipment to ensure their efficiency.	Kitchen layout, energy-efficient appliances, energy-efficient lighting, availability of natural light, routine maintenance of appliances, proper disposal of old equipment/appliances.	Add clarity for has a plan to phase out inefficient ones following their life cycle. Add specifics for what makes kitchen layout important. Specify the equipment/appliances to be properly disposed (refrigerators, freezers, air conditioners, dehumidifiers)	15. The organization incorporates energy efficient appliances, lighting, and kitchen layout (if applicable), and/or has a plan to phase out inefficient ones following their life cycles. Periodic maintenance is performed on appliances and equipment to ensure their efficiency.	Kitchen layout (heat away from cold), energy-efficient appliances, energy-efficient lighting, availability of natural light, routine maintenance of appliances, transitionary plan that estimates usable life of equipment and considers efficient options for replacement, proper disposal of old equipment/appliances (such as refrigerators, freezers, air conditioners, dehumidifiers, etc.).
16. The organization has developed and adheres to a plan that minimizes electricity consumption and aims to get electricity from clean sources.	Presence of on-site renewable energy generation, existence of plans to reduce consumption	Add solar water heating to indicators. Change minimizes energy consumption to maximizes energy efficiency. Be specific about getting energy from clean sources, not including onsite generation. Include something about having less impact on biodiversity and people from light pollution.	16. The organization has developed and adheres to a plan that minimizes electricity consumption and maximizes energy efficiency. The plan aims to get electricity from clean sources and diminish the impacts of light pollution on the community and wildlife.	Presence of on-site renewable energy generation, electricity matrix, solar water heating, existence of plans to reduce consumption, turning off lights whenever possible,
17. The organization tracks and makes an effort to source ingredients from sustainably certified, non-GMO, non-monoculture, organic, or local suppliers. The organization does not include any threatened or invasive species in its products.	Wide variety of species of fruits and vegetables, non-GMO ingredients, polyculture products, organic ingredients, biodiversity-friendly certified ingredients, no threatened or invasive species on the menu.	Explain what a polyculture product is. Change "or" to "and." Switch order to prioritize local suppliers. Add something about seasonal ingredients.	17. The organization tracks and makes an effort to source ingredients from local, sustainably certified, non-GMO, non-monoculture, and/or organic suppliers. The organization uses seasonal ingredients when possible. The organization does not include any threatened or invasive species in its products.	Wide variety of species of fruits and vegetables, non-GMO ingredients, polyculture products (more than one type of crop grown), organic ingredients, biodiversity-friendly certified ingredients, seasonal menus, no threatened or invasive species on the menu.
18. The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and fertilizers on its grounds.	Planting native plants, no invasive species in garden.	Add native plants in gardens, no bare soil, minimal light at night. Change fertilizers to synthetic fertilizers.	18. The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and synthetic fertilizers on its grounds.	Planting native plants, no invasive species in garden, no synthetic fertilizers, natural pest repellents.
19. The organization does not feed the local biodiversity and does not lure or exploit wildlife.	No bird feeders, no scraps for wildlife, food waste not available to local fauna	No comment	19. The organization does not feed the local biodiversity and does not lure or exploit wildlife.	No bird feeders, no scraps for wildlife, food waste not available to local fauna
20. The organization has developed sustainability policies and trains its staff to follow them.	Plan to educate employees on conservation, signs, frequent training.	Add implementation of plan to indicators. Ask for a specific sustainability statement that guides action and mindset.	20. The organization has developed sustainability policies and trains its staff to follow them.	Plan to educate employees on conservation, signs, frequent training, proof of implementation of plan, sustainability statement that guides action and practices.

21. The organization educates its staff, customers, collaborators, and the community about environmental sustainability.	Advertisement of values to customers, signs or regulations about sustainability in the business, posters, certifications on dishes/products.	Add clients to the list.	21. The organization educates its staff, customers, collaborators, and the community about environmental sustainability.	Advertisement of values to customers, clients, signs or regulations about sustainability in the business, posters, certifications on dishes/products,
22. The organization actively participates and encourages others to participate in sustainability practices and initiatives that reflect the values of HEM.	Donations, hosting community events about sustainability, collaboration with external sustainability organizations	Add examples of where donations would go. Change exterior to local, exterior. Add specific values of importance, like water.	22. The organization actively participates and encourages others to participate in sustainability practices and initiatives that reflect the values of HEM, specifically in the areas of water conservation, reduction of greenhouse gas emissions, and biodiversity conservation.	Donations to local sustainability initiatives, hosting community events about sustainability, collaboration with local external sustainability organizations.
23. The organization carefully chooses suppliers that follow sustainable environmental and social practices. The organization diminishes reliance on supplies from large corporations that do not adhere to sustainability goals.	List of supply chain for products, prioritization of sustainable producers, avoidance of large corporation producers.	Add regenerative production to indicators.	23. The organization carefully chooses suppliers that follow sustainable environmental and social practices. The organization diminishes reliance on supplies from large corporations that do not adhere to sustainability goals.	List of supply chain for products, regenerative production, prioritization of sustainable producers, avoidance of large corporation producers.

Appendix H – Analysis of previous applicant interviews

The table below classifies interviewee responses in terms of three parts of the application process (application, certification, network, other) of interest to HEM. There are seventeen interviews. The left two columns record strengths and weaknesses of the application. The right two columns record opportunities and threats to HEM. The color key (immediately below right) indicates the part of the certification process that the interviewee made points about.

Key

Color	Part of application process
Orange	Application
Green	Certification
Purple	Network

Analysis of previous applicant interviews

Strengths of the application	Weaknesses of the application	Opportunities for HEM	Threats to HEM
Did not take long to fill out	Questions did not apply to them	Using people within the network to help fill out the application	Hesitance to say criteria did not apply because of possibly not being certified
Only took 2 days to fill out application	Needed help to fill it out	Add open question about how business will work towards HEM's goals	Not enough instruction, not enough help
Application easy to understand, clear	Took around a month to fill out	Simpler questions for smaller businesses	Lack of access to technology to apply
Took two hours to fill out	Application was hard to fill out	designated person to help fill out application	Difficult to control suppliers' impact
Application was long but this acted as a filter for businesses who did not comply	Took a few days to fill out	Separating the application by sector	Difficult for smaller businesses
Took a day to fill out	Needed help to fill it out	Make a separate application for small businesses who are starting out	Evidence is hard to collect and keep track of
Took two days to fill out	Some things are out of the business's control (effluent from uphill, packaging used by suppliers)	Providing templates and guides for questions such as waste management system	There are not enough options that are more eco-friendly in MV, therefore they have to use plastics, etc.
Contained all questions necessary	Shared electricity and water with other businesses, unsure about usage	Add illustrations to the certification for people who are not strong readers	There could be a risk of a perceived privilege for larger businesses
Strenghens Monteverde identity	More documenting to better show how their being sustainable	Separating the application by sector will help "see how people can reach more goals according to their reality"	Evidence collection is tough
Establishes a product from Monteverde	Delays in receiving the certification	List of possible evidence	Too much is demanded (like PYME) from businesses that produce very little
Tourists can buy something truly from here and pay locals	Applicant businesses must be formalized and well defined, have clear business plan	Adding required sustainability criteria	"I don't have a computer. My husband has a computer from [his work]. But we haven't been able to buy a new one." (7:30)
Their values were represented in the certification, especially quality	Application was long	Separating the application by sector	Requirements they ask for (inscription to the government) are too expensive for small businesses
Would recommend the certification to others	It was hard to provide all the documents, specifically with time constraints	More help by HEM	Business unclear on whether they are certified
Certification helps put one's product out there	Needed help to fill it out	Separating the application by sector	Lack of access to technology to fill out the application
business's values represented in the certification	Took a long time to fill out	Doing both product and business certifications	People often rent and cannot change some things
Promote circular economy	It takes a lot of work and money to do	Doing both product and business certifications	Some concepts in application hard to understand
Helping locals	Frustrating to fill out	Opening up the market for smaller businesses	Confused about whether they were certified

Good opportunity for Monteverde	Format was difficult and they were not able to save the document	Give people tool to measure	Some questions ambiguous/unclear/ indirect
Better position and strengthen their brand	Took a month to fill out	Opportunities to find the best practices	"The small producer cannot participate in HEM even if they have an excellent product. It is made for the big ones" (7:15)
"The effort and reinforcement of a business's culture and way of doing things"	Questions did not apply to them	Doing both product and business certifications	Difficult language in application
Would recommend the certification to others	Needed help to fill it out	Marketing plan, Facebook ad	Thought that they were certified but were not
The certification will lead to the business being more visible and credible	Took two days to fill out	Virtual marketplace	Know how to measure water and energy, but are not actively measuring
Their values were represented by the certification	Questions did not apply to them	Creating something of Monteverde's own	Lack technology to fill out application
Brand identity, represents Monteverde	Long and tedious to fill out	Awareness of tourists to the certification	It was hard to understand the application
Their values were represented by the certification	Too much paperwork	Setting up an international market	Challenging to do everything online
Opens the gates to learning better practices	Needed help to fill it out	Bumper stickers/Signs on the back of buses	application takes time/effort, need to get something clearly worthwhile in return
The certification pushes businesses to improve to comply	Questions did not apply to them	Some businesses don't have the time to find local/sustainable ingredients	Business unclear on whether they are certified
Would recommend the certification to others	Felt frustrated	integrate communication and marketing of the certification	unclear on whether they are certified or not
Can expand the business's market, more exposure	Needed help to fill it out	Doing both product and business certifications	There is a lack of materials in Monteverde which makes it difficult to get everything local
Can help the business sell its products at other stores, it grants them credibility	Application was overwhelming, boring, and bureaucratic, but it might have to be that way	Can help them better their brand	There is a lack of materials in Monteverde which makes it difficult to get everything local
Their values were represented by the certification	Larger businesses have more time	Other certifications limit them to one product	Some products fit into the certification, others don't
Helps with marketing	Not just one category (hotel, farm, and restaurant)	Do both product and business certifications	Many businesses are not formalized
Generates work opportunities for locals	Repetitive questionnaire	Creating something of Monteverde's own	Very slow progress
Would recommend the certification to others	Questions about things you have to do by law stressed out other businesses	To buy ingredients in bulk with other businesses	Need time/help from other people to apply
Local identity	Questions were not tailored to them	Teach people new things like how to farm without pesticides	HEM needs to be more solidified
Would recommend the certification to others	Would be willing to put up marketing materials, but didn't get any	Group should meet more often and help each other to better themselves	Lack of communication
Certification helps people learn about what other businesses are doing	No benefits yet	Use people within the network to help apply	Lack of structure
Learn new ways of going about things and issues some may not be aware or concerned about	No benefits yet	Collaboration to buy in bulk and reduce enviromental impact between members	Lack of communication
Publicity in small businesses	No practical benefits	More involvement	Lack of communication and response by HEM
Gives people ideas on how to improve	No short term benefits, but long term benefits	Certification provides oppurtunity for collaboration	Difference between being in the whatsapp group and being certified is unclear
Creates an identity and leads to growth	There has been little progress and a lack of communication	Sustainability depends on education	
Would recommend the certification to others	No benefits yet		
Helps to strengthen business	No benefits yet		
Helps unsaturate markets	No benefits yet		

Helps businesses know about their own impact	HEM has not done anything
Certification helps them put their products out there	Lack of marketing
Strengthens local art of MV	Tough to do it for own business as well as others
Gives them identity	Not enough support
Good for established businesses	
Lets people know who makes their product	
Helps position them in the market	
"We need something that represents us, that makes the difference between us and everyone else in Monteverde" (0:25)	
Orange economy	
Would recommend the certification to others	
Has potential to grow	
Certification creates a brand	
Group to give/receive help	
Bonds community to work together	
"it makes you get a connection with what everyone is doing" (12:35)	
Versatile, active community with lots of potential	
Useful meetings and trainings	
Work as a team with other businesses	
Part of a community	
Part of a community	
Collaboration in the network	
Group helps to learn	
People in the network are good entrepreneurs	

Appendix I – Literature review of environmental sustainability

The five tables below contain indicators of environmental sustainability that appear in eleven papers and journals. The color of each table indicates the area of environmental sustainability (waste, water, energy, biodiversity/conservation, awareness/action) that the indicators address. In each table, the first column records indicators. The second column records the author of each paper and journal that utilizes the indicators.

Waste indicators

Indicators of environmental sustainability	Author
Composting.	Stan & Sanchez-Azofeifa, 2022
A study of a tourist area in central Italy found that most waste generated by restaurants was food waste, followed by glass, paper/cardboard, and plastic.	Tatàno et al., 2017
Waste separation is quite common in Costa Rica. Businesses of all types set aside organic waste, plastics, and paper. In Monteverde, businesses reported that they collected recyclables for months before driving to recycling centers.	Tatàno et al., 2017
If a restaurant sourced ingredients from a local farm rather than a transnational agrobusiness, it is expected that less waste will be generated (as well as less energy spent).	Tatàno et al., 2017

Water indicators

Indicators of environmental sustainability	Author
"Incentive structures could improve crop and water matching to reduce water stress."	Stan & Sanchez-Azofeifa, 2022
Full restaurants used water for cooking certain dishes, washing lots of plates and cookware, as well as bathrooms, while cafes and bakeries only had to wash a small number of dishes, and food stores had very minimal water use.	Boye & Arcand, 2013
The type of dishes that the restaurant provides. For example, a restaurant that serves a lot of meat products will have a higher water footprint, although indirect.	Boye & Arcand, 2013
The efficiency of dishwashers and toilets.	Boye & Arcand, 2013

Energy indicators

Indicators of environmental sustainability	Author
Rican CLEW's model includes a detailed model of the agricultural sector. Uses equation to calculate emissions "as a function of unit output per animal (UOA), animal load per hectare (AL), and grazing land coverage (GLC) for meat, milk, or mixed production (all exogenous inputs)."	Victor-Gallardo, 2022
The size of the business, number of customers, use of a kitchen, operation hours, and a variety of other factors impact energy sustainability.	Electricity for restaurants, 2022
Longer operating time will generate a greater consumption of energy.	Electricity for restaurants, 2022
Location, lighting, practices/awareness of consumption, heating and cooling systems, and energy efficiency impact energy sustainability.	Electricity for restaurants, 2022
A sustainable layout of the kitchen, consisting mainly of the separation of cooking and refrigeration equipment impacts energy sustainability.	Electricity for restaurants, 2022

Cooking equipment, refrigeration, layout, and maintenance of kitchen equipment.	Kitchen appliances, n.d.
Energy efficient equipment as well as maintenance of the equipment. For example, an efficient gas stove ideally will burn blue, while signs of yellow flames indicate incomplete combustion and an inefficient stove.	Kitchen appliances, n.d.
Refrigeration should be similarly maintained for cracks or leaks in the insulation and opened the least number of times possible.	Kitchen appliances, n.d.
Laguna Mar Restaurant in Monteverde used around 3461 kWh per month, around US$994, as it catered to a large market.	Hotel Laguna Mar, 2020
Although many restaurants kept track of their utilities' bills, the relationship between price and usage was highly variable as it depended on fluctuating demand and global price points.	Hotel Laguna Mar, 2020

Biodiversity conservation indicators

Indicators of environmental sustainability	Author
Four different types of ecosystems: forest, marine-coastal, freshwater and agricultural systems.	Camacho-Sandoval, 2001
Area changes from forest to other uses.	Camacho-Sandoval, 2001
Changes in abundance and distribution of a selected core set of species.	Camacho-Sandoval, 2001
Replacement of local plants vs imported ones.	Camacho-Sandoval, 2001
Total timber volume extracted per hectare.	Camacho-Sandoval, 2001
Methods of harvesting crops.	Camacho-Sandoval, 2001
Total hydroelectric generation.	Camacho-Sandoval, 2001
Soil quality.	Camacho-Sandoval, 2001
Amount and type of fertilizer/pesticides used.	Camacho-Sandoval, 2001
Alien/invasive species.	Camacho-Sandoval, 2001
"Agricultural intensification homogenizes landscapes and reduces forest connectivity."	Shaver, 2015
land use efficiency/ not wasting cleared land.	Shaver, 2015

Awareness/action indicators

Indicators of environmental sustainability	Author
Restaurants build awareness by hanging fliers to spread information about volunteering opportunities or reaching out to local farms to collaborate.	Boye & Arcand, 2013
Buying and selling local and organic ingredients.	Boye & Arcand, 2013
Some restaurants even offered specific dishes made with entirely local ingredients or donated a portion of proceeds to charities and organizations promoting sustainability.	Boye & Arcand, 2013

Appendix J – Sustainability criteria from external certifications

The five tables below contain environmental sustainability criteria that appear in other certifications. The color of each table indicates the area of environmental sustainability (waste, water, energy, biodiversity/conservation, awareness/action) that the criteria address. In each table, the first column records the criteria. The second column records the certification program that employs the criteria (Bandera Azul, CST, Esencial, and ICT). The last two columns record where to find the criteria within each certification (section, page).

Waste criteria

Criterion	Certification	Section	Page
The business has identified the number of contamination sources that affect the sanitary and hygienic quality of the beach. For example: rivers, streams, restuaries, mangroves, illegal discharges, among others.	Bandera Azul	Gold Star Beach Criteria	NA
The business has adequate containers for the disposal of solid waste. These containers are identified.	Bandera Azul	Four Star Beach Criteria	NA
The business has a collection center for the final separation of waste.	Bandera Azul	Four Star Beach Criteria	NA
The organization integrates into its sustainability policy and its plan a sustainable supply that prioritizes products that do not generate the minimum amount of waste, that have reusable packaging or that are rapidly degradable.	CST	Estándar por categorías: Gastronómica	23
The organization monitors and periodically records the waste generation by operational areas and according to types of material with indicators that are incorporated into the business monitoring and evaluation system and takes corrective actions.	CST	Estándar por categorías: Gastronómica	24
The organization involves its internal and external stakeholders in the practices to reduce waste generation in operational areas and/or by client or activity.	CST	Estándar por categorías: Gastronómica	24
Waste is separated, classified, stored, reused, or recycled, reducing the impact on the environment and people. The remaining waste is disposed of in such a way that it does not cause an adverse effect on the environment or the community.	CST	Estándar por categorías: Gastronómica	24
The organization has development and cooperation programs for the management and disposal of waste generated by the operation, especially hazardous waste. The programs are known by collaborators, clients and suppliers.	CST	Estándar por categorías: Gastronómica	25
The organization properly disposes of hazardous and bio-infectious waste.	CST	Estándar por categorías: Gastronómica	25
The organization has an Implemented Comprehensive Waste Management Program that includes responsibilities, waste classification into ordinary, hazardous and special handling, handling and destination of this waste in accordance with the legal framework and associated authorized managers.	Esencial	Sustainability Evaluation Protocol/Explain ation Guide	24
The organization has identified all waste generated in the production process, describing which phase it comes from and the amounts generated. The organization separates and weighs ordinary waste to be valued, according to the types of waste generated in the production unit. (Eg: plastic, aluminum, organic, glass, etc.). The organization weighs ordinary waste that is not recovered (Eg: waste destined for a sanitary landfill). The organization presents data that demonstrates that waste generation is controlled (generation rate), using tables and graphs.	Bandera Azul	Manual de Procedimientos Categoría Agropecuaria	11
The organization provides verification of the criteria: a detailed description of what they do with each of the waste, the treatment they give it.	Bandera Azul	Manual de Procedimientos	11

		Categoría Agropecuaria	

Water criteria

Criteria	Certification	Section	Page
The organization or its policies do not jeopardize the provision of basic services, such as water, energy or sanitation, to neighboring communities.	CST	Estándar por categorías: Gastronómica	16
The organization makes rational use of the water resource, according to its capacity and level of operation, performs consumption metrics, controls leaks and has a plan to reduce water consumption where possible.	CST	Estándar por categorías: Gastronómica	19
The organization integrates into its sustainability policy and its plan actions that guarantee comprehensive water management	CST	Estándar por categorías: Gastronómica	19
The organization measures water consumption and its sources, gives periodic monitoring and recording of water consumption and corrective actions are taken.	CST	Estándar por categorías: Gastronómica	20
The organization optimizes water consumption by promoting the rational use of water in the different operational areas and/or consumption by internal or external clients, as well as implementing preventive and corrective maintenance.	CST	Estándar por categorías: Gastronómica	20
The organization ensures that the water comes from sources authorized for the assigned use.	CST	Estándar por categorías: Gastronómica	20
The organization has identified its sources, types and volumes of sewage water.	CST	Estándar por categorías: Gastronómica	20
The organization treates and discharges wastewater without contaminants.	CST	Estándar por categorías: Gastronómica	21
The organization has documented programs to achieve efficient use of water that include actions such as water reduction, replacement, or reuse.	Esencial	Sustainability Evaluation Protocol/Explanation Guide	25
Operational controls include the prevention of adverse impacts associated with water pollution in accordance with national legislation, including aspects such as direct, intention or accidental discharges, contamination of surface water bodies, marine contamination including that produced by activities carried out on land, pollution by nutrients and chemicals, garbage, wastewater, runoff, seepage into groundwater, among others.	Esencial	Sustainability Evaluation Protocol/Explanation Guide	26
The organization has measurable and implemented goals and indicators for the efficient use of water.	Esencial	Sustainability Evaluation Protocol/Explanation Guide	25
The organization can present a list of the water sources available in the productive unit, including: 1. Underground sources: springs, wells, springs. 2. Surface sources: lakes, rivers, canals, streams and the like. Submit the water concession permit, when applicable.	Bandera Azul	Manual de Procedimientos Categoría Agropecuaria	8

Energy criteria

Criteria	Certification	Section	Page
Zero Kilometer Program.	ICT	Nactional Plan	123
The organization makes rational use of energy, according to its capacity and level of operation, performs consumption metrics, maintains efficient equipment, and has a plan to reduce energy consumption where possible, including the use of renewable energy sources.	CST	Estándar por categorías: Gastronómica	21
The organization integrates into its sustainability policy and its plan, actions that guarantee the rational use of energy.	CST	Estándar por categorías: Gastronómica	21
The organization establishes the consumption base and its goals, gives monitoring, regularly records energy consumption and takes corrective and preventive actions.	CST	Estándar por categorías: Gastronómica	21
The organization has periodic preventive maintenance to equipment and facilities necessary to increase energy efficiency.	CST	Estándar por categorías: Gastronómica	21
The organization has an equipment replacement plan.	CST	Estándar por categorías: Gastronómica	22
The organization has an inventory of alternative energy sources that you can use in your operation, and you have a plan to substitute traditional sources for alternative sources.	CST	Estándar por categorías: Gastronómica	22
The organization makes efficient use of natural light and color to increase the luminosity in certain spaces.	CST	Estándar por categorías: Gastronómica	22
The organization has measurable and implemented energy efficiency goals and indicators to demonstrate improvement in its energy performance.	Esencial	Sustainablity Evaluation Protocol/Explain ation Guide	21
The organization has implemented actions to improve its energy performance through measures such as technical and technological improvements; use of alternative, renewable or less polluting energy, among others.	Esencial	Sustainablity Evaluation Protocol/Explain ation Guide	22
The organization has implemented and quantified in tons of carbon equivalent offsetting activities associated with its greenhouse gas emissions.	Esencial	Sustainablity Evaluation Protocol/Explain ation Guide	23
The organization measures greenhouse gas emissions generated by its operation and activities and establishes procedures to reduce them.	Esencial	Sustainablity Evaluation Protocol/Explain ation Guide	23
The organization uses and promotes transportation alternatives for its operations, activities and the displacement of internal and external actors that reduce their carbon footprint.	CST	ESTÁNDAR POR CATEGORÍAS> GASTRONÓMICA	26
The organization can describe the measures that have been implemented to reduce fuel consumption, as well as evidence through tables with statistics or photographs.	Bandera Azul	Manual de Procedimientos Categoría Agropecuaria	13

The organization can present the data that demonstrates that electricity consumption is controlled.	Bandera Azul	Manual de Procedimientos Categoría Agropecuaria	14
The organization can present documentation that evidences the actions carried out, as well as data that demonstrates the reduction in consumption.	Bandera Azul	Manual de Procedimientos Categoría Agropecuaria	14

Biodiversity/conservation criteria

Criteria	Certification	Section	Page
The organization does not capture, hold captive, manipulate, sell or consume species of flora and fauna with legal protection, in danger of spreading or threatened, unless specifically authorized.	CST	Estándar por categorías: Gastronómica	23
The organization restores and protects ecosystems affected by its operation and promotes their sustainable use.	CST	Estándar por categorías: Gastronómica	27
The organization provides information to internal and external stakeholders.	CST	Estándar por categorías: Gastronómica	27
The organization adopts measures for the sustainable management of biological resources to minimize adverse impacts and maximize benefits.	CST	Estándar por categorías: Gastronómica	27
The organization takes measures to avoid the use of exotic and invasive species.	CST	Estándar por categorías: Gastronómica	27
The organization does not acquire, hold captive, reproduce, consume, exhibit, interact with, sell or trade wild species, except as permitted by law and in accordance with sustainable use practices.	CST	Estándar por categorías: Gastronómica	28
The life cycles of the plantations are respected, considering the product maturation processes. The selection of meats is made taking into consideration the feeding of the animals.	CST	Estándar por categorías: Gastronómica	29

Awareness/action criteria

Criteria	Certification	Section	Page
The organization has defined its internal and external stakeholders and other relevant interest groups.	CST	Estándar por categorías: Gastronómica	6
The organization has a written sustainability policy, which it is reviewed periodically and includes a commitment to maintain or improve positive impacts in environmental, socio-cultural and economic terms; and manage, minimize or eliminate those negative impacts generated or related to the development of its activity.	CST	Estándar por categorías: Gastronómica	6

The sustainability policy is known by the relevant internal and external stakeholders.	CST	Estándar por categorías: Gastronómica	6
In accordance with the sustainability policy, the organization identifies the negative and positive impacts derived from its activities and has designed and implemented an action plan to minimize the former and maximize the latter.	CST	Estándar por categorías: Gastronómica	7
The organization has a person or internal work team duly trained and responsible for implementing the action plans necessary to comply with the sustainability policy.	CST	Estándar por categorías: Gastronómica	7
The organization evaluates its actions, assesses its achievements and implements corrective actions when necessary.	CST	Estándar por categorías: Gastronómica	7
There are established and documented criteria, policies or agreements according to the type of supplier, to which the sustainability requirements requested in the areas of management, socio-economic and cultural impact, and environmental impact are detailed and communicated, for the delivery of goods and execution of the service.	CST	Estándar por categorías: Gastronómica	14
The organization has a documented policy for them which guarantees compliance with the sustainability policy.	CST	Estándar por categorías: Gastronómica	14
The organization has established its mission, vision, and objectives that guide their activities and incorporate sustainability.	CST	Estándar por categorías: Gastronómica	14
The organization's means of promotion and marketing reflect the quality and sustainability of the services provided in a truthful and transparent manner.	CST	Estándar por categorías: Gastronómica	15
The organization, upon request, provides assistance to programs of community development through the use of its facilities, financing, training or volunteering.	CST	Estándar por categorías: Gastronómica	17
The organization prefers certified tourism products and services and promotes and raises awareness among internal and external stakeholders about the importance of certification.	CST	Estándar por categorías: Gastronómica	23

Appendix K – Findings from food sector business interviews

The table below contains responses to interview questions for food sector businesses. The left column numbers the nine food sector business interviewees. The two top rows number and contain the twenty-six questions. The foci of the first ten questions determine the food sector business's a) knowledge of HEM and thoughts about certifications, b) values and priorities, c) environmentally sustainable practices, and d) size. The foci of questions eleven through twenty-six are the business's measurable impact on the following environmental sustainability categories: waste (purple), water (blue), energy (orange), biodiversity/conservation (green), and awareness/action (red). The cells record the responses of each interviewee.

Food sector interviewee responses

Question	Business 1 (farm and shop)	Business 2 (restaurant)	Business 3 (at-home operation)	Business 4 (bakery)	Business 5 (restaurant)	Business 6 (food shop)	Business 7 (restaurant)	Business 8 (at-home operation)	Business 9 (restaurant)
Have you heard of HEM and would you apply?	Yes	No	Yes	No	No	Yes	No, but would like to apply because they already do this	No	No
What do yo want from a certification?		Growth	Marketing and publicity				Maintain good practices, marketing and publicity, create a brand and identity		
What are the core values of your business?	Sustainability and education	Quality, more work for locals	Sustainability, less hunger, more work for locals	Hand-made, honesty, responsibility, customer service	Work as a family	Sustainability	Work as a family	Work with friends, work ethic	Helping the community
Where is your biggest enviromental impact?	Emissions from synthetic fertilizer, fossil fuels from transportation, emissions gases from coffee residues	Electricity use	Buying imported products	Plastic waste	Plastic waste, glass waste		Waste	Plastic waste	Not much impact
Where is there opportunities for improvement?	Improving soil quality, less fertilizer/pesticides	Lamps that are powered by solar panels	Using biodegradable packaging, buy in bulk with other businesses, not using plastic in labels, better forms of transport, cleaning and	Don't know	Reduces electricity use, wash dishes at low pressure	None because they already did them	Reduction of plastic waste (like straws), change to more efficient appliances	Biodegradable packaging, not providing chopsticks	None because they already did them

			producing in batches						
Where is there no opportunities for improvement?			Everything can always be improved	Difficult to phase out plastics because it shows the breads and protects it from water	Cannot spend less water	Some products come packaged	Cannot change natural light of building, some products come packaged	Don't know	
Are any of your products not local?	Yes, fertilizer	Yes, imported angus beef and seafood, local beers, cheese, coffee, vegetables, and fruits	Yes, lots of products come from other countries		Yes, imported cold cuts, tomato sauce, and wines, local meat and vegetables	Yes, but local products when possible	Local bread, cheese, and vegetables	Local vegetables, imported fish	Yes, most products from the coast, local vegetables
Has an auditor inspected your business?	Yes, for climate change	No		No	No		No	No	No
How big is your business?	Farm coffee on 40 hectares	350	N/A		120		410	N/A	42
Do you track how many customers you have?	1000 in 2020, but more now	600		No	900		800	500	750
Do you measure waste?	No	No	No	No	No	Yes, by number of bags	No	No	
Do you know how much waste is in each category?	Most waste is plastic from packagings	No	Not too much organic waste	Most waste is glass	Don't know	Don't know	Mostly organic waste	Mostly organic waste	Don't know
How do you recycle and reuse waste?	All is separated, organic waste is given to farm, oil is used for biodiesel		Reuse plastics	All is separated	All is separated	All is separated, organic waste is given to a farm, oil is used for biodiesel		All is separated, organic waste is given to a farm	
Do you measure water usage?	No but could	Yes, bills per month	No	Yes, bills per month	Yes, bills per month	Yes, bills per month	Yes, bills per month	No	No
How much water do you use?	Can measure it in buckets	CRC 45,000	Don't know	CRC 8000	CRC 20,000	Don't know	CRC 15,000	Don't know	Don't know
What are your biggest uses of water?	Coffee plants themselves. Washing coffee	Washing the dishes		Making breads	Washing dishes		Washing dishes	Not too many uses	Washing dishes
Do you have adequate waste water systems?	Yes, reuse water	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do you measure energy?	Yes, bills, per month	Yes, bills, per month	No	Yes, bills, per month	Yes, bills, per month	Yes, bills, per month	Yes, bills, per month	No	Yes, bills, per month

How much electricity do you use monthly?		CRC 120,000	Don't know	CRC 110,000	CRC 140,000		CRC 200,000	Don't know	CRC 75,000
Do you use energy efficient appliances?	3 cars at the farm, de-pulper to process coffee, coffee beans dry in the sun	Efficient appliances		Gas kitchen	Efficient appliances and layout		Efficient layout, some appliances are old	Home cooking	Efficient appliances and layout
How often do you maintain your appliances?	Frequently, as needed	When they break, try to repair or modify			All new		Try to lenghten the life of the appliances		Every season
Do you measure your impact on biodiversity?	Yes, proxy of soil quality by looking at organic matter, humidity, filtration, ferocity of soil, diversity of birds, acidity levels, plant health, ground cover, native species	No, use only one kind of each vegetable, certified meats		No	No, multiple varieties of vegetables		No, care about the ingredients, only organic	No, but uses organic and local vegetables and seafood is certified	No, do not think about this when buying ingredients
Do you measure your impact on land conservation?	No, but 60% coffee and 40% forest	No		No	No		No	No	No
Do you spread awareness about sustainablity?	Yes, coffee tour spreads awareness on how to produce coffee sustainably	No		No	No		Yes, asks questions to the customers to make them more aware	Yes, asks questions to the customers to make them more aware, promos with reusable chopsticks gift	No
Have you created any sustainablity policies?	No written policies	Yes, signs			No				No
Have you made efforts to train your stakeholders?	Yes	Yes		Yes, workers follow his lead	No		Trains new employees		Yes, trains employees through organizations

Appendix L – Criteria explainers

The table below shows each of the finalized drafted criteria along with explainers for each criterion. These explainers justify each drafted criterion and explain how each criterion enforces necessary sustainable practices. The explainers help businesses understand why they should meet each criterion and prompt them to develop these sustainable practices.

Final criteria and explainers

Final criteria	Explainers
1. The organization properly separates and treats waste in the following categories: ordinary (separated into glass, packaging, paper and cardboard, and organic), hazardous, and special treatment.	It is necessary to assess the businesses properly deal with and properly separate their waste, especially in food businesses, which can produce a lot of waste. Otherwise, waste could pollute the environment or be handled in the wrong manner. This can cause degradation to the environment and counteract HEM's ideals.
2. The organization weighs and tracks its waste, as well as develops and adheres to a comprehensive plan for waste management (including organic waste) in accordance with the requirements of Law No. 8839.	It is necessary to assess that businesses are tracking their waste production and are compliant with waste management laws. Measuring waste production is the best means of quantifying a reduction in waste production. Additionally, businesses must be compliant with the Costa Rican regulations to ensure waste is being disposed of properly.
3. The organization uses biodegradable, reused, recycled, and recyclable materials whenever possible.	Recycled and environmentally friendly materials minimize the amount of materials required as well as waste being produced. This is a great means of minimizing waste production and the effect waste has on the environment and community.
4. The organization minimizes waste in the complete life cycle of the product offered.	An understanding of the complete cycle of materials and products used by a business allows for an understanding of how to properly manage, minimize, and deal with their waste.
5. The organization has developed and adheres to an annual plan to reduce waste production.	A well-written plan that identifies specific ways to eliminate waste production and is strictly followed, evaluated, and amended to adhere to the current situation of the business is vital to a strategic reduction of waste production and also ensures that a business is adhering to HEM's goals and values.
6. Wastewater, including gray and black water, is appropriately filtered, treated (through a septic tank, wastewater garden, or other), and discharged when applicable per Regulation No. 33601: Regulation of Discharge and Reuse of Wastewater and Regulation No. 42075: Regulation for Groundwater Discharge of Treated Wastewaters.	Compliance with proper wastewater treatment is necessary to ensure wastewater is not contaminating the environment. Additionally, businesses must comply with Law No. 33601 to ensure their wastewater is not polluting or detrimental to health. Businesses should also start to make efforts to comply to Law No. 42075 which will start to be enforced in the near future.
7. The organization reuses or repurposes water whenever possible. The organization uses products without harmful or persistent chemicals.	Reuse of wastewater can reduce water consumption as well as act as fertilizer.
8. The organization monitors metrics of water usage from all water sources utilized monthly. The organization calculates water usage per person or unit of production.	Measuring water consumption is vital to monitor efforts of reducing consumption. Additionally, measuring per person or unit of production allows for better comparisons with other businesses and in high and low seasons.
9. The organization has developed and adheres to a plan that decreases water consumption and maximizes efficiency of water usage.	A well-written plan that identifies specific ways to decrease water consumption and is strictly followed, evaluated, and amended to adhere to the current situation of the business is vital to reducing water consumption and ensures that a business is adhering to HEM's goals and values. Additionally, written practices and training to maximize water usage further reduces water consumption.
10. The organization utilizes water efficient appliances and/or has a plan to phase inefficient ones out following their life cycles.	Water efficient appliances can dramatically cut water consumption for purposes that otherwise could be very water demanding.
11. The organization monitors metrics of fossil fuel (gasoline, diesel, bunker, liquefied petroleum gas, etc.) usage monthly, reduces usage, and utilizes renewable energy when possible.	Monitoring consumption of fossil fuels is vital to identifying and monitoring practices for reductions in usage.

12. The organization has designed and adheres to an annual fossil fuel usage plan that reduces carbon dioxide and other greenhouse gas emissions.	A-well written plan that identifies specific ways to decrease fossil fuel consumption and is strictly followed, evaluated, and amended to adhere to the current situation of the business is vital to reducing fossil fuel consumption and ensures that a business is adhering to HEM's goals and values.
13. The organization promotes cleaner methods of transportation (walking, biking, EVs), participates in collective transport, and/or increases efficiency in routes.	Transportation can be very costly in terms of carbon emissions. Decreasing the frequency transportation is required, travel distance, or changing the fuel used for transportation can greatly reduce the carbon footprint of businesses. Additionally, use of local ingredients can eliminate some of these transportation costs and support local producers more.
14. The organization monitors metrics of electricity consumption monthly and performs periodic energy audits of the business.	Measuring electricity consumption and performing energy audits allows businesses to measure their consumption as well as identify areas where they can reduce it.
15. The organization incorporates energy efficient appliances, lighting, and kitchen layout (if applicable), and/or has a plan to phase out inefficient ones following their life cycles. Periodic maintenance is performed on appliances and equipment to ensure their efficiency.	Energy efficient appliances, lighting, kitchen layouts, maintenance and audits allow for reduction of electricity consumption. It also helps to maximize their electrical efficiency and identify areas for further reduction.
16. The organization has developed and adheres to a plan that minimizes electricity consumption and maximizes energy efficiency. The plan aims to get electricity from clean sources and diminish the impacts of light pollution on the community and wildlife.	A well-written plan that identifies specific ways to reduce electrical consumption and is strictly followed, evaluated, and amended to adhere to the current situation of the business is vital to reducing electrical consumption and ensures that a business is adhering to these goals and values.
17. The organization tracks and makes an effort to source ingredients from local, sustainably certified, non-GMO, non-monoculture, and/or organic suppliers. The organization uses seasonal ingredients when possible. The organization does not include any threatened or invasive species in its products.	The ingredients that a business uses can have significant impact on biodiversity. By tracking sources, businesses can eliminate products that come from unsustainable producers.
18. The organization plants native species and removes invasive species from its grounds. The organization minimizes the use of pesticides and synthetic fertilizers on its grounds.	Proper cultivation of the grounds of the business helps to strengthen local species of plants, eliminate invasive species, and minimize chemical pollution from synthetic fertilizers and pesticides. This also allows for food sectors to sustainably produce some products that they may otherwise source.
19. The organization does not feed the local biodiversity and does not lure or exploit wildlife.	Feeding wildlife can have detrimental effects on wildlife and biodiversity. Often wildlife will become dependent on these sources, disturbing food webs.
20. The organization has developed a sustainability mission statement and policy, and trains its staff to follow them.	A comprehensive sustainability plan is vital to ensure the practices of a business are sustainable and maintained. Additionally, this plan needs to be enforced for employees of the business, so these practices are maintained throughout business operations.
21. The organization educates its staff, customers, collaborators, and the community about environmental sustainability.	In addition to planning sustainable operations within a business and its employees, it is beneficial to promote these values to stakeholders and clients. This spreads the sustainable ideals of the business to the community thus promoting the business and generating awareness of more sustainable practices.
22. The organization actively participates and encourages others to participate in sustainability practices and initiatives that reflect the values of HEM, specifically in the areas of water conservation, reduction of greenhouse gas emissions, and biodiversity conservation.	Participation and encouragement of sustainable practices and organizations spreads awareness of susrainable values. It also allows for businesses to learn from each other and strengthen their practices and values throughout the community.
23. The organization carefully chooses suppliers that follow sustainable environmental and social practices. The organization diminishes reliance on supplies from large corporations that do not adhere to sustainability goals.	Using suppliers that produce sustainably supports sustainable practices. Additionally, it takes power away from unsustainable large corporations.