



International Marketing of Low-Carbon Products

An Interactive Qualifying Project Proposal

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Table of Contents

List of Figures	iii
Glossary of Terms	iv
Chapter 1: Introduction	1
Chapter 2: Literature Review	3
National Initiatives	3
INTECO.....	4
International Protocols and Certifications	6
International Affairs	9
Trends Regarding Certifications in the US and European Markets	9
<i>United States</i>	9
<i>Europe</i>	10
Case Studies	14
<i>Life Cycle of Fresh Pineapple</i>	14
<i>Coopedota</i>	15
Summary.....	16
Chapter 3: Methodology.....	17
Objective 1: Identify which certifications make products attractive in the US and Europe	17
Objective 2: Identify the requirements of these certifications	18
Objective 3: Determine the feasibility of implementing the requirements for these certifications in SMEs in Costa Rica	18
<i>Surveys</i>	18
<i>Interviews</i>	18
<i>Focus Groups</i>	19

Objective 4: Road Map Development	20
Timeline	21
Chapter 4: Conclusion	22
References	23
Credits for Figures.....	27
Appendices	28
Appendix A: Sample Survey Questions	28
Appendix B: Sample Interview Questions	29
Appendix C: Sample Focus Group Questions	30

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List of Figures

Figure 1: Label produced by Starbucks® for fair trade espresso beans..... 11

Figure 2: A product label which shows carbon footprint data. 13

Figure 3: Company logo for Coopedota, R.L. in Costa Rica 16

Figure 4: Project Timeline for 8 Week Term in Costa Rica 21

Glossary of Terms

ACP	African, Caribbean, and Pacific Group of States
BSI	British Standards Institution
CAFTA-DR	US – Central America – Dominican Republic Free Trade Agreement
CNP+L	Centro Nacional para la Producción más Limpia
CP	Cleaner Production
EEC	Article 11 of Regulation
EU	European Union
FLO	Fair Trade Labeling Organization
FODEMIPYME	Fondo para el desarrollo de las micro, pequeñas y medianas empresas
FONAFIFO	Fondo Nacional de Financiamiento Forestal
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWP	Global Warming Potential
INTECO	Instituto de Normas Técnicas
IPCC	International Panel on Climate Change
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
NCPC	National Cleaner Production Center
NGO	Non-governmental Organization
PAS	Publically Available Specifications
PES	Payment for Environmental Services
PROPYME	Programa de Fortalecimiento para la Innovación y Desarrollo Tecnológico de las Pequeñas y Medianas Empresas

PYME	Pequeñas y Medianas Empresas (Small and Medium-Sized Enterprises)
SME	Small and Medium-Sized Enterprises
UK	United Kingdom
UNEP	United Nations Environmental Program

Chapter 1: Introduction

In 1997, amidst growing global concerns about the environment, the United Nations Framework Convention on Climate Change began formulating the Kyoto Protocol. Enacted in 2005, it required participating countries to decrease their carbon emissions to five percent below their levels from 1990 over a five-year period (UNFCCC, 2012). As one of these countries, Costa Rica has proven its commitment to protecting the environment in a number of different ways. These include efforts to reduce logging of rainforest trees—the habitat of much of the country’s rich diversity of plant and animal life— and to prevent pollution. Due to its success with national carbon initiatives, Costa Rica has declared its new goal to become carbon neutral by 2021.

Along with the country’s desire to maintain the integrity of the environment, the goal of carbon neutrality also serves as a profitable incentive for Costa Rica’s economy. The Kyoto Protocol provided a way for countries, mostly industrialized nations, to avoid penalties for failing to meet emissions targets by purchasing extra allowances from developing countries, whose emissions fall below their limit. Because Costa Rica is still developing and has already made lowering their carbon emissions a priority, it has a large bank of emissions allowances to sell to other countries through this carbon emissions trading program (UNFCCC, 2012). Therefore, Costa Rica’s economy can enjoy a profit by continuing to keep carbon emissions low.

As a part of the effort to combat climate change, the UN created National Cleaner Production Centers (NCPCs) to animate various host countries to encourage environmentally-friendly business practices. The Centro Nacional para la Producción más Limpia (CNP+L) of Costa Rica was created in 1998. Since its conception, the CNP+L has played an instrumental role in reducing wasteful byproducts of production processes and improving large-scale industrial conditions in areas such as chemical handling (O'Donnell, et al., 2010). The CNP+L recognizes the Costa Rican trend toward lowering carbon dioxide emissions across the board, and hopes to help small- and medium-sized enterprises (SMEs) move in that direction.

Several SMEs have already taken steps toward reducing carbon emissions in their production practices and are developing products that are low-carbon or carbon-neutral. They are interested in taking advantage of the developing markets for such products, especially in foreign countries; however, their willingness to pursue these changes depends on whether their

companies remain profitable. Therefore, the goal of this project with the CNP+L is to identify the strategies SMEs will need to use in order to make their products marketable in foreign countries. To help the CNP+L achieve this goal, our team will determine the desires of foreign consumers regarding low-carbon and carbon-neutral products. Specifically, the CNP+L is concerned with exports to the US and Europe, and with knowing how consumers in these markets respond to product certifications. This means learning which types of national and international certifications are available, and the preparedness of the SMEs of interest in regard to satisfying the requirements of those certifications. The final goal is to determine the steps that SMEs need to take by developing an action plan for the companies to successfully penetrate those foreign markets. Through these endeavors, the CNP+L hopes to effectively guide SMEs into the global market.

Chapter 2: Literature Review

The following chapter outlines the pertinent national and international initiatives by the United Nations toward global greenhouse gas reduction. In addition, an exploration into the relevant corporate protocols and product certifications provides a setting for the analysis of product success in Costa Rica's main export markets, including the United States and Europe.

National Initiatives

Prior to the creation of the Kyoto Protocol by the United Nations Environmental Program (UNEP), the Costa Rican government instituted a national program known as Payment for Environmental Services (PES). On a broad scale, the program attempts to charge businesses for their use of environmental resources, and then redirects that money to pay participating landowners to keep their land in its natural state. The PES aims to reduce greenhouse gas emissions while protecting the natural biodiversity and beauty of Costa Rica (Pagiola, 2008). This program further developed into the Pax Natura Project, which seeks to protect Costa Rica's scenic beauty as well as to achieve more quantitative goals such as preventing the release of over 500,000 metric tons of carbon emissions. Both of these programs are monitored by the Fondo Nacional de Financiamiento Forestal (FONAFIFO) whose mission is to protect the forests of Costa Rica by providing the funds which businesses need to reduce their impact on the environment (Garcia, 2012).

The CNP+L of Costa Rica works closely with FONAFIFO. As one of twelve cleaner production centers in Central and South America, the CNP+L promotes and monitors the clean production of the business sector in Costa Rica (Perera, 2012). While FONAFIFO focuses mainly on monitoring the use of natural resources and ensuring that land owners are paid in accordance with PES, the CNP+L is responsible for communicating the advantages of cleaner production to enterprises in Costa Rica.

The official concept of Cleaner Production (CP) originated from UNEP in 1989. UNEP introduced CP to its member countries as a preventive strategy to achieve the efficient use of natural resources while minimizing waste and risks to humans and the environment (United Nations Environmental Programme, 2012). With the government providing assistance for businesses considering re-evaluating their practices, CP is an attainable goal for SMEs in Costa

Rica. While many of the governmental benefits initially spanned several legal documents, they have recently been combined into “Ley PYME” or Act 8262 (Rojas, 2009). In this legislation, many of these incentives have been reworked to apply specifically to SMEs, such as funds and grants which are guaranteed by the Fondo para el desarrollo de las micro, pequeñas y medianas empresas (FODEMIPYME) and the Programa de Fortalecimiento para la Innovación y Desarrollo Tecnológico de las Pequeñas y Medianas Empresas (PROPYME). These programs, created by the Act, provide up to eighty percent of the required finances for projects geared towards developing and strengthening small businesses. Through this funding, the programs aim to increase competitiveness in the marketplace (Ministry of Science and Technology, 2012). In addition to the FODEMIPYME and PROPYME, the CNP+L has worked with private and public banks to establish credit lines for small businesses looking to finance cleaner production initiatives even further (Rojas, 2009).

In addition to providing funding to help businesses achieve cleaner production, the CNP+L provides essential services such as energy and safety training and audits for companies of all sizes. The organization assists companies in implementing international policies, such as the Kyoto Protocol, the Stockholm Protocol (which mandates the reduction of carcinogenic pollution) and the Basel Protocol (which mandates the safe handling of hazardous waste). The audits identify strategies for reducing their pollution levels, such as installing more efficient lighting and protecting employees from work-associated risks (Perera, 2012). The CNP+L also provides training for clients pursuing cleaner production practices, allowing them to monitor their own production practices independent of the CNP+L.

INTECO

The Instituto de Normas Técnicas (INTECO) is the primary business monitoring and regulating agency in Costa Rica. Created in 1998, INTECO oversees organizations to ensure that their standards meet the national requirements in safety, pollution, energy usage, and employee rights. Certifications are also awarded by the agency, which announce that a company has gone above and beyond basic requirements in areas such as safety and environmental impact. These certifications often mean that a company has complied with an internationally recognized standard, which is significant in the international market. The Environmental Management Certificate, for example, is awarded to businesses that have exemplified efficient management of

environmental impact in accordance with the International Organization for Standardization (ISO). Based on ISO-14001, a policy framework for designing environmental management systems, the certification signifies a company's commitment both to reduce their impacts at the source as well as to handle unavoidable and previous damage (INTECO, 2012).

In order to become certified, a business must apply to INTECO. Upon receiving the application, INTECO personnel will perform an initial audit of the company, generating a full report that details all practices that could be improved in regards to their environmental impact. After this, the responsibility falls on the company to devise a corrective plan of action in a certain time period mandated by INTECO. INTECO agents evaluate this plan and, if satisfied, they will award the organization the Environmental Management Certificate (INTECO, 2012). While implementing this certificate may seem costly in both time and money, there are many benefits to certification. First, in order to implement these procedures, a company must become more efficient in areas such as electricity use and waste reduction. As a result of the improved efficiency, the company will also reduce costs across the board (International Standards Organization, 2012). The certification requires a company to draft an environmental policy. Implementation of this policy demonstrates the company's competence thereby improving relations with the regulators. It also markets a positive image of the company to the community and other stakeholders by providing written evidence of the businesses' environmental efforts. (INTECO, 2012)

ISO 14001 also provides a modified preferential treatment for SMEs, who benefit by having more time to devise their plan of action. INTECO also takes into account the SMEs' need to adapt to the constantly changing demands of the global market. Consequently, this modified standard allows more flexibility for SMEs in terms of the extent they must correct their environmental deficiencies and the time period they are allotted to actually carry out their plan. (INTECO, 2012)

The Environmental Management Certification from INTECO is a highly sought after certificate in Costa Rica. Of the 127 certifications that have been awarded between 1998 and 2009, almost a quarter of them have been for Environmental Management (INTECO, 2009). Companies seek the numerous benefits that come with certification, such as improved public image and relations as well as the international recognition that comes with fulfilling ISO 14001.

International Protocols and Certifications

Along with the United Nations' efforts to motivate countries to reduce greenhouse gas (GHG) emissions, the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) realized the need for a standardized way of totaling and reporting these emissions. Beginning in 1998, leaders from WRI and WBCSD agreed to work toward a non-governmental organization (NGO) and business partnership that would standardize ways for measuring GHG emissions. In 2001, the cooperation yielded the first edition of the GHG Protocol, *A Corporate Accounting and Reporting Standard*, commonly referred to as "The Corporate Standard". In its entirety, the GHG Protocol Initiative included different documents for public, corporate and project sectors to best help each appropriately account and report their GHG inventory. This inventory is a compilation of the company's GHG emissions with respect to the six greenhouse gases outlined in the Kyoto Protocol: carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, and sulfur hexafluoride (WRI & WBCSD, 2012). The GHG Protocol has developed partnerships in Brazil, China, India, Mexico, the Philippines, and North America to promote the formation and application of GHG programs in each area. By establishing partnerships with the leaders of various countries, the GHG Protocol hopes to build the capacity for long-term collaboration in climate change efforts. Additionally, the GHG Protocol's international strategy aims to encourage the synchronization of GHG participants' markets through the use of a universal set of standards for accounting and reporting of GHG emissions (GHG Protocol, 2012).

"The Corporate Standard" version of the GHG Protocol was initially designed specifically for business practices, with the goal of simplifying and reducing the cost of compiling inventory as well as for suggesting effective approaches for managing and reducing emissions. Overall, the step-by-step guide targets the consistency and transparency of GHG recording. To aid these goals, the GHG Protocol includes tools for inventory calculation, both across and within various industry sectors. Consistent with the means previously proposed by the International Panel on Climate Change (IPCC), the calculation tools in the GHG protocol have been adapted for non-technical company personnel (GHG Protocol, 2012). Different industry groups such as the International Aluminum Institute, International Council of Forest and Paper Association, and WBCSD Cement Sustainability Initiative have also partnered with the GHG Protocol to further develop trade-specific tools (WRI & WBCSD, 2012). These tools

enable the companies to incorporate the protocol into their work environment smoothly with as few changes as necessary.

Following the GHG Protocol, the International Organization for Standardization (ISO) released the ISO 14064. Involving four years of development by over 175 representatives from 45 countries, ISO 14064 was created to address the problem originating from the ISO Technical Management Board's Ad Hoc Group on Climate Change in 2002. This gathering recognized that businesses' attempts at accounting for GHG emissions still seemed disjointed (Boehmer & Weng, 2006).

Similar to the GHG Protocol, the three part standard defines a method for quantifying and reporting emissions. Through the addition of minimum requirements for qualification as acceptable inventories, businesses become motivated to actually make changes in their practices. For businesses, Part 1 of the ISO 14064 outlines the specifications and gives guidance about accurately computing and reporting greenhouse gas emissions in the inventories (Delany & Wintergreen, 2010). Part 1 derives its core principles from the GHG Corporate Standard Protocol, making both documents highly compatible and representing one of the goals of ISO 14064 of complimenting current popular GHG programs. The section begins by establishing the foundational standards of an accurate inventory, taken directly from the GHG Protocol: relevance, completeness, consistency, transparency, and accuracy. Relevance covers the inventory's appropriate reflection of the company, completeness ensures the inclusion of all sources or activities pertaining to GHG emissions, consistency entails the use of constant methods over time to enable long-term comparisons, and transparency calls for the report of all relevant information, issues, or assumptions during the process so as to develop a clear account of all calculations. Finally, accuracy certifies that the reported GHG emission levels in the inventory actually represent the true amount of emissions the company produces (WRI & WBCSD, 2012).

With these principles in place, the document continues by defining the process of developing a satisfactory inventory through the three key aspects of establishing inventory boundaries, quantifying greenhouse gases, and reporting the GHG emissions. The first aspect of setting perimeters for the inventory serves as a crucial initial step in which the context of the entire inventory is identified, breaking down organizational and operational boundaries. Organizational boundaries outline the establishment of which facilities are involved in the scope

of the inventory. Depending on the company's targeted evaluation goal, ISO 14064 suggests two different approaches of "control" or "equity share" boundaries. For "control" boundaries, only facilities where the company has authoritative control are included, whereas with "equity share" boundaries, all facilities where the company has interest or investment are included. These definitions set the stage for the next tier of "operational boundaries" that identify which processes within the established borders apply to the accounting of GHG emissions. Furthermore, these emissions are categorized into direct and indirect emissions. This breakdown serves to differentiate between emissions originating from within or outside the company's organizational boundaries (Delany & Wintergreen, 2010).

While the GHG Protocol and ISO 14064 initiatives cover guidelines for creating an accurate and honest GHG inventory of the company, the Publically Available Specifications (PAS) 2050 defines a more explicit evaluation with regards to the carbon footprint. PAS 2050 was published in October 2008 by the British Standards Institution (BSI) and sponsored by the Carbon Trust and UK Department of Environment, Food and Rural Affairs in response to the increasing demand for communicating carbon footprint values on products. The driving group of 11 authors consisted of representatives from business, industry, academia, government and non-governmental organizations. The resulting PAS 2050 covered specific requirements for goods and services to outline the evaluation of the life cycle assessment approach (LCA) as a means of establishing a product's carbon footprint. Building upon the guidance and requirements chartered in the ISO 14000 series as well as the GHG Protocol, the PAS 2050 clarified the previously adopted methods by defining explicit requirements for an assessment (Sinden, 2009). The specification streamlines the goal-setting phase for businesses by assessing GHG emissions correlated with the life cycle of a product and compiling the findings in a form easily communicated to the public. To further facilitate its use by businesses, PAS 2050 simplifies the mandatory elements that ISO 14044 identified as necessary for the assessment of a product's life cycle impact. By declaring that the specification would solely address the impact category of global warming, PAS 2050 saves businesses from having to select categories of focus. The calculations for impact are also specified as multiplying the global warming potential (GWP) of each GHG released by its emissions mass and sum all the results (*GHG Protocol*, 2012).

International Affairs

In the last decade, Costa Rica has begun to pursue more economic advancement internationally, not only through protocols relating to greenhouse gases, but also through trade and exports. In 2009, Costa Rica added to its existing trade deals with Canada and Mexico by entering into the US – Central America – Dominican Republic Free Trade Agreement (CAFTA-DR). This agreement opened doors to other member countries' markets, such as the United States' where 99.8% of Costa Rican exports could be tariff-free (EIU ViewsWire, 2012). As a part of her political platform, President Chinchilla continues to expand these free trade agreements with countries such as China and to maximize the benefits from the existing agreements (Costa Rica, 2012; St John, 2012).

Despite the political efforts surrounding the Free Trade Agreements, Costa Rica's trade deficit has increased. Last year, the deficit rose 41%, amounting to 5.8 billion USD, whereas in 2010 the deficit totaled 4.1 billion (External sector: Recent developments, 2012). Both the import levels and growth rates exceeded their export comparisons in 2011, leading the Central Bank to predict a continued widening of the deficit by potentially 4.2% GDP (Costa Rica, 2012). Totalling 16.5 billion USD, the imports of 2011 represented a 19.5% year-on-year expansion with a significant portion of 54.8% coming from fuel and lubricant products. Traditional exports such as coffee, plantains, and bananas characterized the fastest growing export sectors; however, exports overall only increased 10.2% (External sector: Recent developments, 2012). Considering this current imbalance, the expansion of SMEs' exports to foreign markets would help offset the country's trade deficit.

Trends Regarding Certifications in the US and European Markets

United States

The United States is one of Costa Rica's main export markets, and therefore it is important to understand how Costa Rica's environmentally friendly initiatives in business will apply to the US market. First and foremost, US consumers overwhelmingly state that they would like to purchase green products, with 87% indicating that they are concerned about the environmental impacts of the products they buy. Despite this huge majority, only a third of those surveyed actually say they are ready to actively seek out and purchase products deemed

‘environmentally friendly’. Adding to this discrepancy is the fact that only a quarter of consumers report that they have ever actually bought something, other than food or lighting, because of the product’s reduced environmental impact. As a result of this low willingness to follow through on their interest and make green purchases, these products make up less than 5% of their respective markets (Bonini & Oppenheim, 2008).

US consumers have many reasons not to purchase these products, the most common being that they are more expensive than their mainstream alternatives. On the consumer side, the low success rate of these products is attributed to poor marketing campaigns, which provide little information to potential customers about these products. These poor marketing campaigns are demonstrated by the fact that two-thirds of American consumers cannot name a green brand (Bonini & Oppenheim, 2008). In addition, over 61% of American consumers believe that environmentally friendly products are inferior to their ‘normal’ counterparts, and consumers in general tend to distrust any “eco-friendly” claim made by the government, media or company itself (Bonini & Oppenheim, 2008). On the business end, reducing environmental impact often involves taking steps to use biodegradable packaging and to increase recycling of waste material. These practices are neither economical nor practical for most companies and thus there is no government incentive to develop either of them (Min & Galle, 2006). This is supported in part by the fact that, in comparison to most developed nations, there is relatively little regulation of business practices in regards to their environmental impacts in the US (Hong Kong Trade Development Council, 2012).

Europe

European market interest in certified sustainable products has grown significantly in the past two decades. Many different types of certifications exist to distinguish sustainably produced goods from those manufactured by traditional methods. Each certification has its own set of requirements and specifications that companies and merchandise must satisfy. Three categories that have held European interest recently are: “fair trade”, “organic”, and “carbon-neutral”. Figure 1, below, shows an example label of a fair trade certified product.



Figure 1: Label produced by Starbucks® for fair trade espresso beans.

The concept of fair trade has branched out to many different agricultural and manufactured products including coffee, textiles, and bananas. Fair trade began in the banana industry in the 1990's and has since made remarkable progress. The initiative focuses on producing bananas in a more sustainable manner with respect to both the social and natural environment. Certification requires meeting the international standards set forth by the Fair Trade Labeling Organization (FLO), which includes provisions to ensure maximum return to the local producers and eliminating forced and discriminatory labor (Murray & Raynolds, 2000). The movement tries to counterbalance the firm grasp that large corporations, which often use less sustainable and socially-just operations practices, have on the industry. In the 1990's, more than fifty percent of the world's production of bananas belonged to Chiquita Brands and Dole Food Corporation. However, consumer surveying has indicated that a shift to fair trade certified bananas over Chiquita or Dole is possible in the European Union. A large proportion of consumers in the EU have stated that, if fair or other alternative trade options were available, they would purchase alternative trade over traditional bananas, even at a price differential as large as ten percent. (Murray & Raynolds, 2000)

The fair trade banana initiative in the EU has met several obstacles over the years. European tariff laws have given preference to traditional companies in former colonial nations such as the ACP countries (African, Caribbean, and Pacific Group of States) to export produce to the EU. At the same time, these laws have restricted the quantity of merchandise that smaller companies, such as fair trade groups, can export to European nations. This has resulted in a

biased market that prevents fair trade companies from meeting the full demand for their products (Kilian, et al., 2011). In recent years, some of these tactics have been deemed in violation of free trade agreements, which has allowed the fair trade movement to get a foot in the door of the EU markets. However, other problems still face fair trade. Smaller companies do not have the shipping capabilities that large corporations have to transport their fresh produce to foreign markets quickly. Additionally, competition exists between fair trade companies and the US-based Rainforest Alliance-Chiquita Brands collaboration, which markets a more well-known certified label with weaker social justice requirements than fair trade. These complications have collectively resulted in consumer confusion and reduced sales of fair trade produce (Murray & Reynolds, 2000).

Another movement that has grown in popularity in the EU is the organic market. The EU in general boasts the largest global demand for organic products, while also having a very low domestic supply of organics. Most of the imported organic produce and raw materials involved in EU beverage production comes from developing countries, providing a great market potential for Costa Rican certified organic companies. Certification, however, is a very rigorous process for EU organic markets. The process of organic certification in the EU is delineated in Article 11 of Regulation (EEC) 2092/91, and most developing countries attain import certification under Article 11(6). This provision essentially states that developing countries must be approved for import by individual member states of the EU. Once the authorization for importing certified organic goods is granted, companies must be re-inspected annually to ensure that production standards maintain adequate similarity to EU standards (Barrett, et al., 2002). This certification and re-evaluation process is the source of the high costs facing producers of organic imports to the EU. Organic growers have devised several strategies to offset these costs. For instance, a group of small farmers can apply as a cooperative to lessen the costs incurred by individual producers. Farmers also try to pursue local authorization bodies, if they exist, because they usually charge lower certification fees compared to international agencies. However, depending on the market that the producer wants to access, requirements may exist specifying the use of certain certification agencies over others. If cost limits a producer's ability to comply with these demands, it can lead to direct effects on the success of the merchandise in the market (Barrett, et al., 2002).

More recently, customer demands for information about the sustainability of merchandise have led to a new market in the EU for the exports of certified carbon-neutral companies. In the case of Dole Costa Rica, carbon neutrality has been a theme in current business practices. Dole Costa Rica has been actively promoting Corporate Social Responsibility, which is a set of policies that companies follow to demonstrate responsibility for their actions towards the environment, employees, customers, and other stakeholders. In 1998, Dole Costa Rica was the first agricultural producer to be granted ISO 14001 certification in response to its environmental management system. Partially due to Costa Rica's progressive goal for carbon neutrality by 2021, Dole Costa Rica announced their commitment in 2007 to become carbon neutral within the next ten years. This goal could prove to be a profitable marketing move due to the emerging European opinion of "carbon neutrality as a marketable feature" (Kilian, et al., 2011 p. 4). This trend suggests that EU citizens, in an effort to reduce their own environmental impact, have shown a heightened interest in knowing the carbon footprint of produce and other products that they purchase. As a result, consumers have pushed for labeling that provides details about the carbon footprint and emissions of individual product units (see Figure 2). Retailers and supply companies alike have begun to incorporate this information in various ways in recent years, but currently the market is still relatively devoid of businesses offering carbon-neutral products with indicators of their exact carbon footprint. Dole has capitalized on this by promising to offer the first bananas and pineapples to be certified carbon neutral and is already working with government groups such as FONAFIFO (Kilian, et al., 2011). Overall, this could provide an excellent opportunity for Dole to take the lead on marketing carbon-neutral products in the EU.



Figure 2: A product label which shows carbon footprint data.

Fair trade, organic, and carbon-neutral company certifications have all seen increased popularity in the EU in recent years, and although there have been complications with implementing their widespread use, they show great potential as tools that Costa Rican companies can use to promote their products in European markets. By pursuing certifications such as these, Costa Rican companies can gain access to growing markets abroad and promote environmental and social sustainability.

Case Studies

Life Cycle of Fresh Pineapple

In 2012, Welsley Ingwersen published a case study regarding the environmental impact of the Costa Rican pineapple production process. Costa Rica is the largest exporter of fresh pineapple to the United States and European Union. Overtaking coffee as the second largest export in 2005, 85% of imported pineapple in the United States and 71% in the EU originated from Costa Rica. Tripled production over the past decade has prompted rapid pineapple farm expansion from 15,000 to 45,000 hectares. Ingwersen's study examines the pineapple life cycle as a model to assess the environmental impact of the production of a high-demand fruit.

Beginning with the growing process, pineapples require regular fertilization applied directly to the plant leaves and additional use of herbicides and pesticides to combat insects and competition. One hundred and fifty days after planting, growers use a chemical solution to force the mature plants to produce fruit which is manually harvested six months later. The next phase, the packing process, involves washing the harvest in chlorinated water and separating the less desirable pineapples to be sold domestically or thrown away. The approved pineapples are chemically treated for preservation, packaged in boxes, and rapidly cooled and refrigerated to await shipment.

Voluntary participation in the study consisted of producers representing all three growing regions in Costa Rica, which are located in the north, and near the Pacific and Atlantic coasts. Data collection involved questionnaires sent to producers, supervised interviews to ensure proper understanding of the questionnaire, and on-site visits to assess information regarding soils, topography, and operations. Ingwersen's analysis considered the cycle in three phases: farm, packing and distribution. Forty-six percent of the non-renewable energy consumed over the

course of the life cycle originated from the farm stage, primarily due to use of diesel by machinery. In the packing stage, the use of cardboard boxes represented the greatest environmental impact because of the consumption of resources required for its upstream production process. During the distribution phase, three-quarters of the non-renewable energy usage resulted from refrigeration during transport. Ingwersen used the PAS 2050 standard to calculate the carbon footprint, deriving 60% of the footprint from the farm stage. Other large contributors to the overall footprint included the production of the cardboard boxes for packing (24%) and the refrigeration required during transport (15%) (Ingwersen, 2012).

In defining the greatest factors contributing to emissions, the study predicted the sensitivity of the overall emissions impact relative to changes in those factors. One category consisted of reducing agrochemical use during the farm stage by 10% which projected the most reductions in eutrophication (-9%), freshwater ecotoxicity (-7%) and carbon footprint (-4%). Another category involved packing with reusable, non-cardboard boxes and resulted in the greatest predicted reductions across these impact categories: non-renewable energy (-30%), carbon footprint (-24%), and ozone depletion (-29%). This study concluded that the most important opportunities for impact reduction consisted of caution around agricultural products, packaging using reusable cartons, and use of energy efficient refrigeration (Ingwersen, 2012). While these suggestions statistically promised a lower overall impact, the study did not include an investigation or consideration of the integration of these practices into the producers' operations. Without a developed plan that can assure sustained profitability, the producers will most likely not accept the changes into their farms and therefore no reductions will actually result from the research.

Coopedota

In contrast to the unsustainable practices of the majority of coffee enterprises in Costa Rica, Coopedota, a large co-op of coffee growers in Los Santos, has adopted energy-efficient production methods. About fifteen years ago, in light of the goals set out in the Kyoto Protocol, the co-op began lowering their greenhouse gas emissions. In 2009, after the climate summit in Copenhagen, they broadened their focus to include becoming carbon-neutral. Their efforts have been so effective that in March of 2011, Coopedota released the first carbon-neutral coffee in the world (Solis, 2011; Voinea, 2012). The British Standards Institution (BSI), an independent



Figure 3: Company logo for Coopedota, R.L. in Costa Rica

organization dedicated to creating standards criteria and helping companies adapt to those criteria, certified the coffee as carbon neutral. In accordance with the rules for the Institution's specification for the Demonstration of Carbon Neutrality, Coopedota has offset their greenhouse gas emissions released during the coffee life cycle, which includes the production, transportation, and sale of the coffee beans (BSI, 2010). Their carbon reduction strategies during production include utilizing their power more efficiently and ultimately lowering their energy consumption by over 35%. They also recycle the coffee husks separated from the beans to replace 95% of fuel wood. Furthermore, the co-op uses 80% less water and creates ethanol with the wastewater. This ethanol, and methane created from the biodegradation of waste, contributes to running the production processes (Solis, 2011).

Summary

As demonstrated by the international initiatives in recent years, the emphasis on reducing the global environmental impact has become a major priority of the UN. Despite the substantial progress that Costa Rica has made through both national and international initiatives, the country can reap further benefits in the form of emission reduction by encouraging SMEs to pursue carbon-neutral market opportunities. European markets seem to be promising targets for the exports of certified SMEs. By taking advantage of these market openings, SMEs can help increase export levels thereby aiding the reduction of the trade deficit in Costa Rica.

Chapter 3: Methodology

The goal of this project is to provide guidance to SMEs in Costa Rica, facilitating their entrance into foreign markets with low-carbon and carbon-neutral products. This overall goal will be achieved by completing the following objectives:

1. Identify which certifications make products attractive in the US and Europe
2. Identify the requirements of these certifications
3. Determine the feasibility of implementing the requirements for these certifications in SMEs in Costa Rica
4. Develop a “road map” that SMEs can use to earn these certifications and enter foreign markets.

Objective 1: Identify which certifications make products attractive in the US and Europe

To achieve this objective, our team will perform research, both general and archival. General research will examine trends in exports from Costa Rica, as well as other countries, to foreign markets of interest, namely Europe and the US. Products of interest to the CNP+L include coffee and other produce, environmentally-friendly fertilizers and agrochemicals, and electronic equipment and services. We will look for trends that illustrate whether consumers have preferences relating to the production of the products. Furthermore, we will try to determine if customers’ willingness to pay changes based on the production method.

In addition to the general research, our group will conduct archival research at CNP+L to look for case studies involving companies, within or outside Costa Rica, which have earned certifications of interest and which have also successfully entered foreign markets in Europe or the US. We will be interested in multiple types of information from these case studies. We will want to know if the businesses had to make any changes to company policies. In addition, we will investigate if the company took advantage of any loans or grants, or if they made any key investments to fund certification efforts. We will also want to know if the businesses used any advertising campaigns to promote their products in foreign markets.

Objective 2: Identify the requirements of these certifications

Once we identify the certifications that make products more attractive to the consumer, our team will research the requirements of those certifications, primarily through research of the certifications and their parent organizations (ex. ISO 14001 and ISO). In particular, we will investigate the application process and costs of obtaining certification. Once gathered, this information can be condensed and kept on hand as it will be indispensable throughout the course of this project. The requirements will be used in order to generate and analyze surveys for companies and then to divide the companies into groups based on their compliance and awareness of these requirements.

Objective 3: Determine the feasibility of implementing the requirements for these certifications in SMEs in Costa Rica

Surveys

To determine the implementation feasibility, we will survey the SMEs of interest. Our liaison at the CNP+L will provide a list of these companies upon arrival in Costa Rica. We expect the selected businesses will represent a variety of levels of familiarity with the requirements for product certifications, and they will have different attitudes toward gaining such certifications. Therefore, it is important to first clarify which SMEs have a working knowledge of the certifications and which do not. Furthermore, we will gauge the SMEs' attitudes toward getting low-carbon and carbon-neutral products certified. An electronic survey sent to the SME executives will provide this surface-level, baseline information. We will determine which executives to survey through the contact information given on the company websites, if they exist, and from discussing the issue with our CNP+L liaison. We expect email questionnaires to elicit more responses in a shorter time than those sent by paper mail. Since the questionnaire results will provide essential information for organizing later steps in research, the surveys must be distributed early. The sample questionnaire is included in Appendix A.

Interviews

Once our team receives results from the surveys, we will categorize the businesses into four groups: (1) those that are already certified, (2) those that meet the requirements but are

unaware of the certifications, (3) those that do not meet certification requirements but are aware of the certifications, and (4) those that do not meet certification requirements and are unaware of the certifications. Once separated, we will interview groups 2 and 3 using a semi-structured set of questions (Berg, 2009). For the companies that do not meet certification requirements but are aware of them (Group 3), our questions will center on the obstacles that are preventing them from certification. For the companies that meet requirements but are unaware of certifications (Group 2), we will ask questions pertaining to their interest in getting certified as well as ways to make the process easiest for their business. Sample interview questions are found in Appendix B.

Focus Groups

From the survey, there will be two additional categories of companies that will not be included in the set of companies included in the interviews: the companies who do not meet the requirements and are unaware of the certifications (Group 4) and the companies that are certified (Group 1). Time permitting, we will conduct separate focus groups for each group with leaders from the companies. Due to the vast difference between the groups, we feel that breaking up the focus group sessions will make the individual company representatives more comfortable and more willing to take the time to participate. The separate sessions will also allow our team to appropriately guide each focus group according to the audience as well as effectively extract the certain perspectives we are looking to gain from the session.

First, we will meet with representatives from the businesses in Group 1. The main aim of this focus group will be to acquire insight regarding these companies' current practices, since they actively operate with the targeted certifications. The moderator will ask the participants about how their companies came to implement the certification requirements or procedures, as well as what made them choose to pursue the certifications. Within these realms, we will extract details about plans of enactment along with obstacles encountered during the process. Additionally, we will pose questions regarding the effects the changes have imposed on the personnel involved, such as investors, owners, employees, and customers. The accomplishment of the goals of a company depend on the actions of its workers, so recognizing them as an important factor will provide a more realistic view of the every-day implications of making

changes. We will also ask about the top-level view pertaining to the overall profitability and success of the company in relation to the certifications.

After gauging the attitudes regarding certification from Group 1, we will gather representatives from the other group of companies that do not meet requirements and are not aware of the certifications (Group 4). We will begin this session by giving a brief overview of the certifications the CNP+L and our team have targeted. This overview will include the purpose of the certifications and the associated benefits, uncovered from our research and the first focus group. Following this explanation, we will ask questions about why they feel they are not familiar with these certifications as well as what actions the Costa Rican government or the CNP+L could take to better publicize the certifications and the principles associated with them. The second objective of the focus group will be to relay the insight gained from the first focus group to these companies and to gauge their reactions. After first outlining the requirements corresponding to each certification, we will assess the representatives' initial willingness to implement the requirements. Our group will then share the highlights from the first focus group regarding how those companies executed the necessary changes to fulfill the requirements. Finally, we will ask the participants if they feel they could employ these strategies within their companies successfully and, if not, what major barriers they foresee preventing progress. Sample focus group questions are found in Appendix C.

Objective 4: Road Map Development

After gathering and analyzing the research and data obtained from the outlined methods, our team will then develop a "road map" that companies will be able to follow to achieve the targeted certifications. Since the CNP+L works with several SMEs, most likely with different exports and target markets, our team will attempt to develop a general plan that can be implemented by any of the companies currently working with the CNP+L. This translates to a skeleton structure that is independent of products, market sector, or other company specifics. Furthermore, the plan will allow for various levels of entry to account for a company's current progress regarding the requirements. To apply this concept, our road map will have to break the process down into quantitative stages that can be clearly defined and achieved through a step-by-step process. By establishing this configuration, the progression between stages will be guided

by action steps that businesses can smoothly incorporate into their practices and effectively carry out.

Timeline

Following the project timeline, shown in Figure 4, is essential to the successful completion of this project. It is crucial that the surveys be sent out early, within the first two weeks, as the continuation of the project depends on receiving sufficient survey results. While the team waits to receive the completed surveys, the residual background research will be completed, ensuring the group has a solid understanding of every aspect of the target certifications. The companies must also be classified into their four groups based on the survey results for the next steps. Interviews of group 2 and 3 companies will begin in the third week, providing sufficient results have been received. These interviews will continue for two weeks, so that as many companies may be interviewed as possible. As the interview phase concludes, the organizational phase for the focus groups will begin. This is expected to be one of the most difficult steps, as we will need to find an acceptable time for multiple business leaders to come together. Once organized, the focus groups will be run in the sixth week of the project. The results of the focus groups will be analyzed and evaluated in order to reach the final conclusions in week seven. The project will be presented the following week.

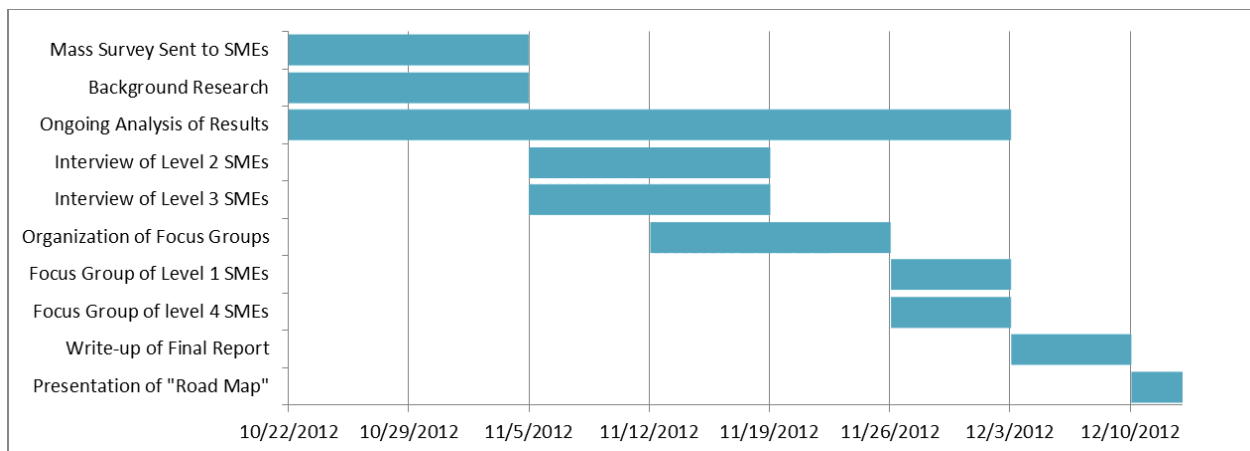


Figure 4: Project Timeline for 8 Week Term in Costa Rica

Chapter 4: Conclusion

The CNP+L seeks strategies for increasing the profitability of SMEs expanding their products to markets in the US and Europe. The goal of this project is to help SMEs successfully enter these foreign markets with low-carbon or carbon-neutral products through obtaining advantageous product certifications. To achieve this goal, our team must first identify which certifications or protocols attract consumers' attention in each market, and then determine strategies through which those standards can be reached. Additionally, we will analyze the feasibility of implementing the requirements for the various certifications. This will be done through surveying, interviewing, and leading focus groups with a range of SMEs. Finally, the information we gather will be compiled into a general action plan that the CNP+L can ideally give to any SME to guide the company toward popularity in these foreign markets. We look forward to helping the CNP+L with this project.

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Credits for Figures

Figure 1: Label produced by Starbucks® for fair trade espresso beans.

<http://www.starbucks-melody.com/2010/01/02/a-starbucks-shared-planet-an-introductory-lesson-about-ethical-coffee-sourcing/>

Figure 2: A product label which shows carbon footprint data.

<http://sciencemadefun.net/blog/?p=1834>

Figure 3: Company logo for Coopedota, R.L. in Costa Rica

<http://www.coopedota.com/>

Figure 4: Project Timeline for 8 Week Term in Costa Rica

Produced by this IQP team

Appendices

Appendix A: Sample Survey Questions

1. What are the primary exports of your company?
2. Are you familiar with any of the following protocols or certifications? Circle all that apply.
 - a. Greenhouse Gas (GHG) Protocol
 - b. ISO 14064
 - c. PAS 2050
 - d. PAS 2060
 - e. Certification of Environmental Management
3. For those that you circled above (if any), have you fulfilled the requirements of any?
4. For those that you circled above (if any), have you pursued but not fulfilled the requirements of any?
5. Are you familiar with the processes behind obtaining the following product labels?
 - a. Fair Trade
 - b. Organic
 - c. Carbon Neutral
6. If so, do any of your products carry these labels?

Appendix B: Sample Interview Questions

Group 2: Companies that meet requirements but are unaware of certifications

*NOTE: interview will begin with brief overview of information on certifications and requirements

1. What reasons drove your companies to pursue these requirements?
2. Would you be interested in becoming certified?
3. Do you see value in obtaining the certifications?
4. What do you feel the CNP+L or Costa Rican government could do to better publicize these certifications?

Group 3: Companies that do not meet requirements but are aware of certifications

1. Have you attempted to pursue these requirements?
2. Do you have any interest in pursuing the certifications through achieving the requirements?
3. What barriers, if any, do you see in obtaining the certifications?
4. Do you see value in obtaining the certifications?

Appendix C: Sample Focus Group Questions

Group 1: Companies that are certified

1. What motivations led your company to become certified?
2. How did you learn of these certifications?
3. What benefits, if any, has your company seen as a result of the certifications?
4. What obstacles, if any, did your company encounter during the process of fulfilling the requirements?
5. Would you recommend these certifications to other companies?

Group 4: Companies that do not meet requirements and are unaware of certifications

**NOTE: This focus group will begin with an overview of the certifications and their requirements as well as a summary of information obtained from Focus Group (A)*

1. What do you feel the CNP+L or the Costa Rican government could do to better publicize these certifications?
2. After learning about benefits other companies have seen from these certifications, are you interested in pursuing these certifications?
3. Could you see your company using any of the methods used by other companies to achieve the requirements?
4. What obstacles, if any, do you foresee if you were to pursue obtaining any of these certifications?