SUSTAINABLE SUPPLY CHAINS IN THE FOOD AND BEVERAGE INDUSTRY

by

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ABSTRACT

The food and beverage sector of the economy has faced increasing pressure from consumers to provide transparency on the sources and operations related to their products. Responsible and ethical procurement is especially challenging for food and beverage, because agricultural commodities typically rely on low-cost labor inputs and environmentally-damaging technology and practices in order to produce high volumes. These negative environmental and social impacts threaten the reputation of food and beverage firms in the short-term, and the certainty of food supply capacity in the long-term. Therefore, supply chain management in food and beverage firms is shifting from an operational activity to a strategic activity.

This research identified the key categories of information that significantly determine the feasibility, opportunity, and/or perhaps urgency of working toward a sustainable supply chain in agriculture. A concise, yet suitably comprehensive analytical tool for supply chain professionals and corporate social responsibility (CSR) practitioners in the food and beverage sector was developed. The Sustainable Agriculture Supply Chain Assessment (SASCA) is a simple screening tool for large food and beverage companies to evaluate, improve, or benchmark the sustainability of their agricultural supply chains.

Key findings of this research are:

- Prevailing supply chain incentives and norms often contradict the behaviors necessary to improve environmental and social performance. Creating a sustainable supply chain requires different models and working relationships.
- Although agriculture is a mature sector, there remain significant inefficiencies in on-farm resource management that present opportunities for environmental improvements through use of better management practices (BMPs).
- The WTO and other trade agreements are significant determinants of supply chain leverage in global agriculture.

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Finally, I would like to thank my family and friends, my MAP team at the Ross School of Business, as well as the students, alumni, staff, and faculty at the Erb Institute for Global Sustainable Enterprise, who provided ongoing research assistance and encouragement throughout this project.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

Table 1. List of Acronyms

BMP	Better management practices
CSR	Corporate social responsibility
FLO	Fairtrade Labelling Organization
GMO	Genetically-modified organism
LCA	Life-cycle assessment
LDC	Lesser developed country
LOHAS	Lifestyles of Health and Sustainability
NGO	Non-governmental organization
OECD	Organization for Economic Cooperation and Development
PRiSM	Professionals for Responsible Supply Chain Management
R&D	Research and development
SASCA	Sustainable Agriculture Supply Chain Assessment Framework
STEP Analysis	Social, technical, environmental, and political analysis
TBC	The Beverage Company
WTO	World Trade Organization
WWF	World Wildlife Fund

INTRODUCTION

The food and beverage sector of the economy has faced increasing pressure from consumers to provide transparency to the sources and operations related to their products. Responsible procurement and development of sustainable supply chains is especially challenging for the food and beverage sector, because agricultural commodities frequently have marginalized labor and major water and soil impacts on the environment. Further, the global nature of food in our world economy adds spatial and temporal dimensions to the supply chain that complicate communications, institutional arrangements, diffusion of technology or best practices, and interpretations of what constitutes 'sustainability.'

The research goal of my practicum is to identify the key categories of information that significantly determine the feasibility, opportunity, and/or perhaps urgency of working toward a sustainable supply chain in agriculture. Because sustainable supply chains are an emerging business issue, to-date the prevailing model for sustainable supply chain work has been a case-by-case basis where the firm primarily "learns-by-doing." From my research I wanted to develop a clear, concise yet suitably comprehensive analytical tool for supply chain professionals, corporate social responsibility (CSR) practitioners, and researchers to mitigate the pitfalls and resource-intensiveness of learning-by-doing.

I have developed a simple analytical tool -- the Sustainable Agriculture Supply Chain Assessment Framework (SASCA). SASCA is targeted to professionals in the food and beverage industry and is intended as a preliminary screening exercise before a firm devises more detailed plans for sustainable supply chain work. I created a hybrid framework that utilizes a value chain analysis common to business strategy coupled with an institutional analysis approach often used in political science and economics.

My project scope is limited to agricultural commodities that are globally produced and traded on large scales. Further, the intended audience is primarily for mid- to large-cap firms whose core business is in the food and beverage sector. While evaluating the sustainability of an entire supply chain would realistically examine effects of

transportation, packaging, and disposal, my research will focus exclusively on the upstream points of on-farm production and processing.

Finally, a 'sustainable supply chain' for the purposes of this project, will be defined as any supply chain that has improved environmental performance and social impacts relative to the industry norm. Sustainability is intentionally a moving target; therefore my research will assume a firm pursues better practices than their current performance and there is no definitive best practice. As is the case with any shift in process or technologies, what may be deemed a 'sustainable supply chain' today may be viewed unsustainable tomorrow due to unintended consequences or a shift in baseline standards.

I am hopeful that my research will raise awareness on sustainable agriculture challenges that will enable industry to be more strategic in their supply chain management and more realistic about the expected results and time-frame implementation for sustainable supply chain work. Ultimately, I hope that practical application of this Framework may catalyze on-the-ground social and environmental improvements in agricultural supply chains.

The report begins with a Background Information section, which provides summary information on the state of modern agriculture and its broad environmental and societal impacts. Recent consumer trends and attitudes on sustainability and CSR are also presented. The Research Methods section details the approach used to create the SASCA Framework, and also presents SASCA with instructions on how to use the framework. Three case studies follow, applying SASCA to three commodity supply chains I studied when working with a large beverage firm – sugar, orange juice, and coffee. At the request of the company, it is not referred to by its real name in this practicum, but is rather designated as "The Beverage Company," or "TBC." Finally, the Conclusions section summarizes key insights from my research that are broadly applicable to sustainability in agricultural supply chains, including some simple recommendations.

BACKGROUND INFORMATION

State of agriculture

Agriculture is the largest industry on the planet. It employs an estimated 1.3 billion people and produces as much as $1.3 trillion of goods directly off the farm (UN FAO, 2002).

Producing food is nothing new. What is dramatically different is the scale of production and efficiency farmers have achieved in the past century thanks largely to the technological improvements of the green revolution. Farms rely significantly on external energy inputs to boost productivity, most of which are rooted in fossil-fuel based technologies. Mechanization of farms has greatly reduced manual labor demands and made possible the expansion of farm sizes. Fertilizers and pesticides (mostly fossil-fuel based) have also boosted productivity in agriculture. Most recently, biotechnology innovations and genetically modified organisms (GMOs) have added a whole suite of new technological options to further improve productivity. The net result of these technological improvements has been a four-fold increase in world farm productivity since 1900 in spite of only a 30% increase in cultivated area (UN FAO, 2002).

Sustainability on the farm

Modern agriculture barely resembles the farms of nursery rhymes and children's books. Today a typical farm in the US is acre upon acre of irrigated, monoculture plantings of grains. The average farm size in North Dakota today is a whopping 8000 hectares (Pollan, 2006). Mechanical equipment and agrichemicals have increased fossil fuel intensity in agriculture. In developing countries slash-and-burn agriculture steadily is reducing the area of undisturbed natural environments (Clay, 2004).

While we continue to enjoy increasing levels of agricultural productivity, the earth's soil, water, energy, and land quality have suffered significantly as a result. The natural cyclings of soil nutrients and water have also been dramatically altered, resulting in

imbalances whose consequences are felt far distances from farms. For example, the Gulf of Mexico has an 18,000 km^2 dead zone at the Mississippi River's delta, largely due to the fertilizer runoff carried downstream from all the farms of the Cornbelt (US NOAA, 2003). The divvying of the Colorado River's water to western states in the early 20^{th} century, especially to irrigation of California's Central Valley, left Mexico with a measly 10% of the River's annual estimated flow (Reisner, 1993).

Recognizing that modern agriculture causes serious problems in the natural environment, it is also important to acknowledge the social problems with modern agriculture. The commodity trade system has squeezed profitability margins of farmers to the point that many farmers cannot even cover costs of production with the prices they fetch at market (Clay, 2004). Further, the farm labor in modern agriculture is poorly paid and often works under unsafe and unethical conditions. Ironically, half of the world's 3 billion suffering from malnutrition live or work on a farm (Sustainability Institute, 2003).

Food demand is predicted to double within 50 years, illustrating the important role industrial agriculture can and should play in feeding the world's growing population. The world's farms already produce enough food for everyone to have 3500 kcal/day, but about 1 billion people remain underfed due to unequal distribution (Kimbrell, 2002). For example, in the US, roughly 50% of total food production is fed to livestock and poultry (Heller and Keoleian, 2000). Technology may succeed in producing food to feed the world, but it cannot force people and governments to address society's inequities.

The global grocery store

Globalization has dramatically changed the grocery store of developed countries. Today, our aisles are stocked with year-round grapes courtesy of Chile, pineapples flown in from Costa Rica, farm-raised shrimp shipped from Thailand, and olive oils and vinegars hailing from Greece. OECD consumers enjoy more options than ever, and real prices for food have fallen dramatically in the past 30 years. Today Americans spend only 10% of their income on food (Heller and Keoleian, 2000).

The same is not true for developing countries, where families spend as much as 75% of their income on food. This discrepancy between OECD and non-OECD countries' real food prices is heavily tied to country subsidies that distort global trade in agriculture. Around the world, 90% of food production is consumed domestically (Clay, J., 2004). Tariffs on agriculture goods are about 40% of total sales, in contrast to manufactured goods, where tariffs comprise only 10% of total sales, making agriculture one of the most protected industry sectors in the world economy.

The consequence of agricultural subsidies, quotas, and tariffs cannot be overstated. Periodically, mainstream news media highlights agricultural trade conflicts such as Mexico's tortilla riots of 2007 and the European Union's Banana Wars of the mid-90s. While every story has unique facts, there tend to be recurrent themes. Trade liberalization and open markets cause domestic producers to lose price protections from the government, exporting farmers gain access to new markets, and some consumers may win or lose depending on how the national price compares with the global competitive price (Hill, 2005).

While theoretically subsidies protect domestic farmers, the reality is that the bulk of government subsidies in the US fill the coffers of a few agribusiness conglomerates such as ADM, Cargill, and Tate & Lyle. In 1950, farmers received roughly one-third of the $420 billion produced globally in agribusiness, but in 1990 US farmers received only 3-4% of the industry's sales (Heller and Keoleian, 2000). The capital-intensive, large-scale production model of the 20th and 21st century has driven the industry into consolidation to these few players. Now, ADM and Cargill are expanding their share of the pie by vertically integrating up and down the agriculture value chain. Downstream industries, such as food and beverage, packaging, retail, and food services, have also managed to expand their share of the wealth generated by food production, distribution, and consumption. Today American farms generate 1% of the country's GDP. Related industries (e.g. restaurants, food and beverage brands, and transportation services) comprised 14 times that share of GDP (Pollan, 2006).

Consumer trends

In the US, only 1% of the population is farmers and people are increasingly migrating to cities, their suburbs, and the exurbs. Most of us live hundreds to thousands of miles from our food sources and have a very poor understanding of how our food is cultivated, processed, and consumed. The recent popularity of New York Times bestsellers Fast Food Nation, the Botany of Desire, and the Omnivore's Dilemma all illustrate Americans' growing interest and confusion with food and modern agribusiness. The once simple decision of what to eat has now been complicated by terminology: what do 'organic,' 'trans-fat free,' and 'all natural' really mean?

A small but growing segment of consumers have discovered the social and environmental problems in modern agribusiness. These socially conscious consumers want food products that mitigate environmental damages and positively address economic inequities in the industry among supply chain players. In some product categories, such as specialty coffee, these highly informed consumers also are willing to pay a premium above traditional prices in order to ensure products are 'sustainably produced.' A UNEP report on sustainable marketing indicates that consumers from several OECD countries may switch brands or boycott brands based on corporate reputation, as shown in Figure 1 (UNEP, 2005).

Roper's segmentation (Richards, 1997), the LOHAS data (LOHAS, 2006) and MORI (SustainAbility, 2005) classification schemes all focus on assessing consumers attitudes *and* behaviors with respect to corporate social responsibility (CSR). While the category titles differ, their descriptions are similar. In all three data sets, shown in Figure 2, there is a solid niche market for sustainable products comprising roughly 15-30% of the market.

The mainstream consumers, however, coined "Sprouts" and "Grousers" by Roper, feel concerned about the environment but refuse to pay more for greener products and have a low threshold for altering behavior on behalf of social and environmental causes. This poses a challenge for large food and beverage firms with pre-existing, mainstream

consumer brands. Their existing customer base will not pay a premium for sustainably sourced products.

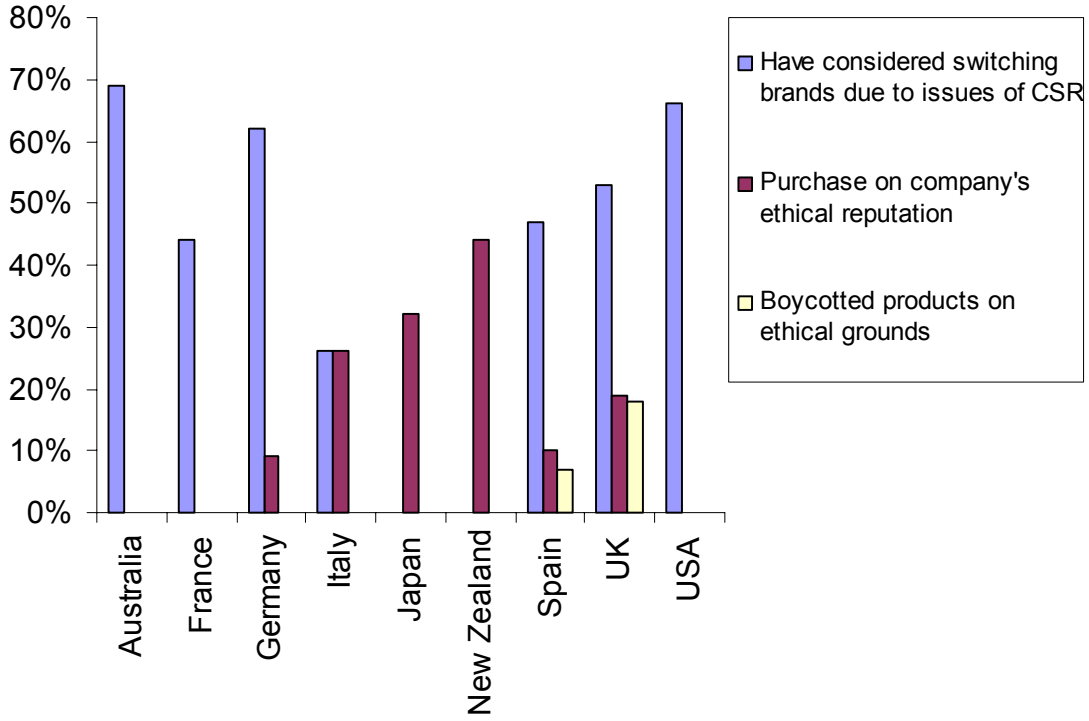

Figure 1. Consumer attitudes and self-reported behavior toward company's CSR reputation (UNEP, 2005).

* Where bars are not shown for certain countries, this reflects a response rate or zero, not missing data.

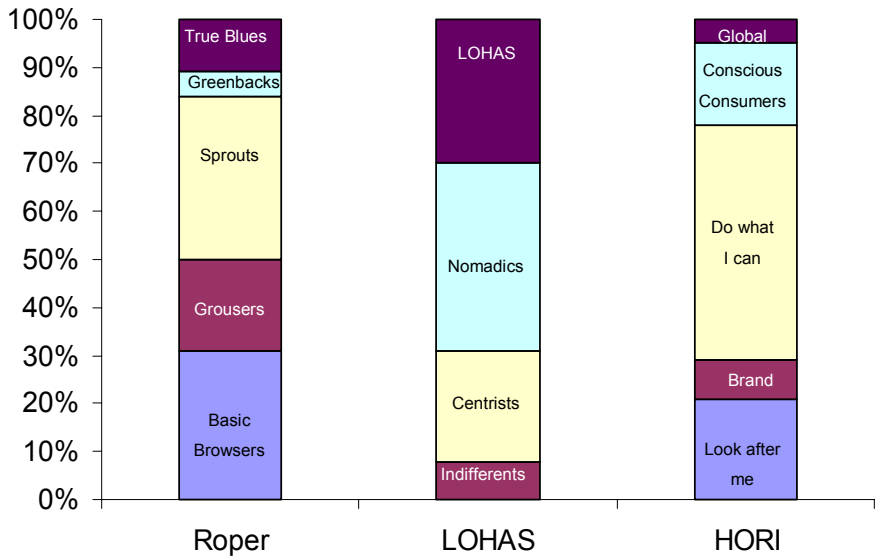

Figure 2. Classification of consumer behavior on ethical purchasing (UNEP, 2005).

RESEARCH METHODS

Data Collection

I utilized several data-gathering methods for this project. First, the foundation of my research was my work experiences in 2006 working with The Beverage Company on three sustainable supply chain teams - citrus, coffee, and sugar for several brands of the Company. This work experience was supplemented by a short-term consultant assignment with the "Price-mart" Stores Global Procurement team through the MAP (multidisciplinary action project) experience at the Ross School of Business. "Price-mart" is a large, global big box retailer that sells groceries among many other items. To protect company anonymity, I will refer to it as Price-mart in this paper. I studied Price-mart's produce procurement practices in Chile for the MAP project.

To complement the applied research I conducted a limited review of relevant business strategy, supply chain management, and marketing theory. I also researched the state of corporate environmentalism, sustainable agriculture, and agricultural trade economics in order to contextualize my case studies. In addition to reviewing literature, I conducted several interviews with industry practitioners, whose organizations are listed in Appendix A.

Approach

After considering several possibilities for synthesizing my research results, I developed a hybrid framework that pairs the components of a value chain analysis common in business strategy with the approach of an institutional analysis common in political science and economics theory. The blending of these two analytical tools comprises the Sustainable Agriculture Supply Chain Assessment Framework (SASCA). Figure 3 shows a generic value chain typical for a globally produced agricultural commodity.

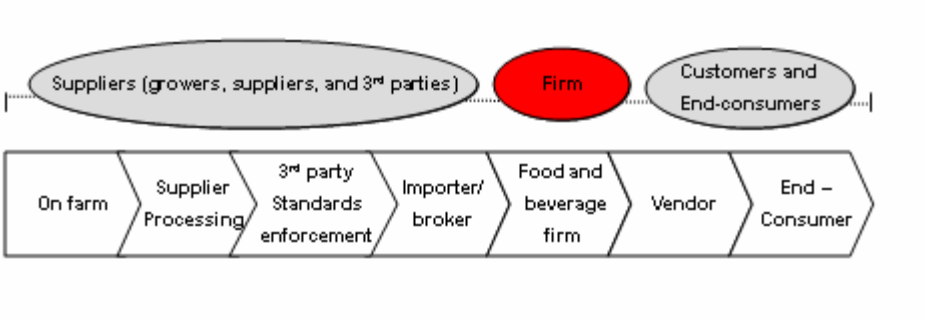

Figure 3. Typical value chain for a globally produced agricultural commodity, from crop to consumer.

While a value chain analysis is useful for looking internally into a supply chain, the strategic challenges of sustainability issues involve forces external to the industry, such as political and legal institutions, non-governmental organizations (NGOs), and technological change. In order to adequately evaluate these forces I supplement the value chain analysis with an institutional analysis of the social, technological, environmental, and political factors (STEP Analysis) (Hill, 2005). A STEP analysis is helpful for evaluating the external macro-environment that affects all firms, as illustrated in Figure 4. Such external factors usually are beyond the firm's control and may present threats and opportunities; however, engaging with firm stakeholders is a useful approach to understanding these external institutions.

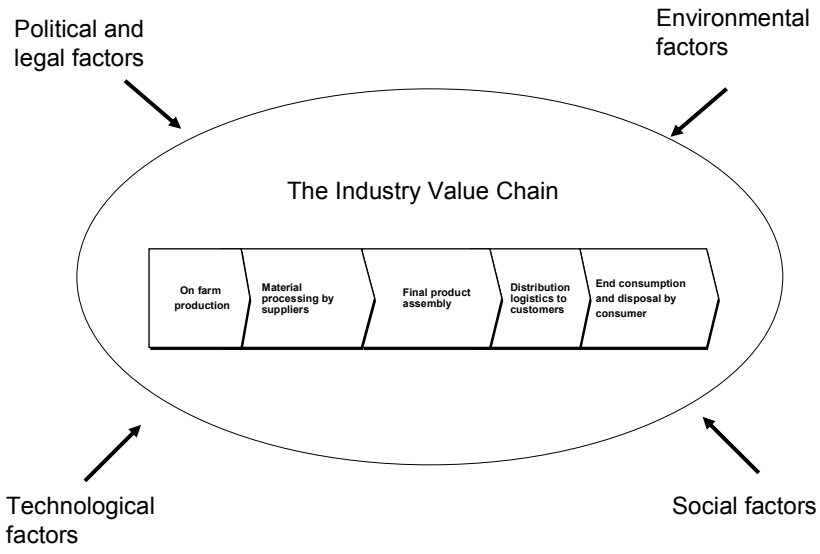

Figure 4. External factors that affect an industry's supply chain.

Scope

The project scope is limited to agricultural commodities that are globally produced and traded on large scales. While evaluating the sustainability of an entire supply chain would realistically examine effects of transportation, packaging, and disposal, my research will focus exclusively on the upstream points of on-farm production and processing. I limit my scope to these points in the supply chain because in agricultural supply chains, significant social and environmental impacts occur in these stages and they are also the areas of the supply chain with least visibility to food and beverage firms and retailers (Sustainability Institute, 2003). The scope of this analysis is shown in Figure 5.

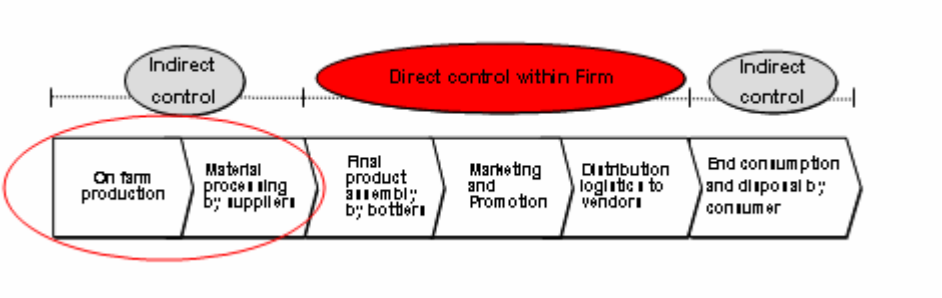

Figure 5. Agricultural supply chain and focal area of this research.

Assumptions

A sustainable supply chain, for the purposes of this project, will be defined as any supply chain that has improved environmental performance and social impacts relative to the industry norm. Sustainability is intentionally a moving target; therefore my research will assume that there is no definitive best practice. This philosophy of continuous improvement is also consistent with standard practices in traditional supply chain management (Anupindi, 2006).

Limitations and Uncertainties

My analysis is broad in coverage but shallow in detail. This is because the framework is intended only as a preliminary screening step for sustainable supply chain work. Different commodities, geographic conditions, and countries can have significantly different agricultural and economic practices that must be investigated on a case-by-case basis in order to move from theory into action.

SASCA is also limited in that it is a static analysis. Any change in conditions, such as a WTO ruling or a major crop failure in a producing country, would require a reassessment of the supply chain.

As illustrated in Figure 5, I limit my analysis to the two most upstream activities in the supply chain, another limitation of my analysis. After using SASCA as a screening step,

an environmental life cycle assessment (LCA) is recommended to fully capture the entire supply chain's environmental and social impacts. LCA is an analytical tool to evaluate the environmental consequences of a product holistically, across its entire life. Typically, energy and raw material inputs and air, water, and solid waste outputs are mapped and inventoried over the entire life cycle of a product from the production, use, to final disposal phases (UM-CSS, 2007). This results in a more complete, albeit more time- and data-intensive, assessment of the product's sustainability. In the food and beverage sector, LCAs were used to first motivate McDonalds' switch from Styrofoam to paper packaging in the 1980s (Hoffman, 2000). More recently, LCAs have drawn attention to the energy intensity and climate change consequences of food distribution. Statistics from several wholesale markets in the United States show that fruits and vegetables are traveling between 1,500 and 2,500 miles from farm to market, an increase of roughly 20 percent in the last two decades (Halweil, 2006).

Table 2 presents the SASCA framework. There are eight categories for assessment. For the value chain analysis there are questions on the firm, suppliers, vendors and end-consumers, and the industry. For evaluating the macroenvironment there are the four categories of a STEP analysis – social, technological, environmental, and political factors.

Table 2. Sustainable Agriculture Supply Chain Assessment Framework (SASCA)

	Question	Implication	Findings
Firm	**Value chain activities**		
	Sales and Marketing: Does your sales and marketing team have interest in marketing sustainability products?	Sustainable supply chain work must be communicated to your consumers to reap reputational benefits, which requires support from marketing.	
	Procurement: Is procurement centralized or decentralized?	It is easier to execute sustainable supply chain work through one procurement process rather than through multiple offices and procedures.	
	Compliance: Have legal or firm environmental standards been violated historically? If so, what were the frequency, severity, and outcome?	Compliance is the first step and often a good basis for sustainable supply chain activities.	
	Corporate organization and incentives		
	Do you have support for sustainability and social responsibility work from company leadership?	Numerous case studies and surveys have shown that executive leadership is essential to make sustainability and CSR company priorities.	
	Are there experts within the company that have worked on sustainable brands or sustainable supply chains?	You can and should leverage internal expertise in sustainability.	
	Stakeholders		
	What mechanisms for stakeholder engagement does your firm currently employ? Are they sufficient?	You must be aware of your stakeholders concerns, and should try to remain in regular dialogue with them.	
	Are stakeholders' expectations reasonable? Achievable? Appropriate?	You cannot please all your stakeholders, but you should listen to their input.	
	Does your firm have relationships established with the relevant institutions (e.g. Transfair, Sustainable Agriculture Network)?	Most sustainable supply chain work is strengthened by engaging with third-party NGOs external to the supply chain.	

	Question	Implication	Findings
Suppliers	**Leverage**		
	How many possible suppliers could you work with for this commodity?	The more potential suppliers you have, the more motivated suppliers will be to meet your sustainability standards. Diversifying your supply base also protects your supply chain from local crop failures.	
	Are you a significant share of your suppliers' business?	The larger your share, the more leverage you can wield.	
	Will more sustainable production practices result in a higher quality product?	Most supply chains already have systems and incentives in place to improve quality. If sustainability can be added as another quality feature to the commodity, then existing systems may be adapted.	
	How critical is the suppliers' product to your business?	The more critical the ingredient, the weaker your leverage on suppliers.	
	Communications		
	How much information is shared between the supplier and your firm?	More information sharing tends to result in better performing supply chains, benefiting all players.	
	How do you track the performance of your suppliers? Does your system include sustainability-related metrics?	Scorecards are easy tools to compare performance across your suppliers. Adding sustainability metrics to your scorecard creates incentives in the supply chain for sustainability.	
	What is the nature of your supply chain relationships? Are they long-term and relational or short-term and strictly transactional?	Long-term commitments are better candidates for sustainability initiatives because they more closely align supplier and firm interests.	

	Question	Implication	Findings
Vendors and End-Consumers	**Vendors**		
	Do your vendors track your performance with a scorecard or something similar? If so, do they score you on sustainability-related metrics? What is the nature of customer relationships? Are they long-term and relational or short-term and strictly transactional?	If vendors evaluate your firm on sustainability metrics, supply chain activities are likely a focal area of their sustainability concerns. Your vendors can be powerful allies in sustainable supply chain work, since they directly connect your products to end consumers.	
	Consumer Attitudes and Brands		
	How well-informed are your end-consumers? Will end-consumers pay a price premium for sustainably produced products? Is there a niche consumer base for a sustainable 'version' of your products?	If buyers are aware of sustainability issues in the supply chain, they are more likely to pressure your firm. If you can fetch a price premium for sustainable products, then the added profitability can absorb cost increases. It may be more effective to launch a brand extension (ex: Organic Cheerios) rather than change your existing product.	
Industry	**Competition**		
	Do you compete primarily on price or on product differentiation (e.g. quality, features, brand)? Do your competitors already have established brands and reputation for sustainability-oriented products and practices?	Cost-based competition makes sustainable supply chain work difficult, as sustainable supply chain initiatives are always cost increasing in the short term. If your competitive landscape already has sustainable-marketed brands, then you may 1. Strategically choose not to compete on this attribute; or 2. Determine that sustainability is becoming an expected product attribute that you must provide to remain competitive.	
	Cooperation		
	Would it be possible to form an industry alliance with your competitors to uniformly change sustainability practices in the industry's supply chain? What stakeholders and NGOs have your competitors aligned themselves with? Does it make sense to seek out the same organizations or different ones?	Sustainability work in commodities often requires the involvement of numerous firms in order to catalyze change and avoid putting any firm at a competitive disadvantage. If there are too many standards in an industry (ex: organic, fair-trade, shade-grown, and bird-friendly coffee), then this confuses consumers and is a disservice to the industry as a whole	

	Question	Implication	Findings
Social	Is there a network such as a cooperative that connects growers for purposes of sharing technical knowledge and organizing for bargaining?	Networked producers can more easily learn better management practices and pool resources to adopt expensive technologies.	
	Are most farms staffed by family labor or paid labor?	Family-staffed production typically includes child labor, which may violate laws or company labor policy.	
	What are typical injury-rates and mortality-rates of on-farm and in-plant labor?	High worker safety risks in agriculture can often be addressed through better technology and practices.	
	What percentage of final product value is paid to producers and suppliers?	Economic prosperity is a vital component of social justice in agricultural supply chains that resonates with end-consumers.	
	How do producers' wages and benefits compare with industry and country averages?		
	Has the Fair-trade Labeling Organization (FLO) or similar bodies established social standards for cultivation of this commodity?	FLO is currently the dominant international NGO setting social standards in commodities. They control use of the fair-trade certification label most widely recognized by consumers.	
	Do on-farm laborers have access to or funding for acceptable living conditions, potable water, sanitation, housing, education, transportation, and health care?	Farm labor may reside on-site and depend on the farm owner for basic living necessities. Poor hygiene can also pose a food safety threat.	
Technological	Is there sufficient R&D into farming practices and technologies and are there mechanisms for technical knowledge transfer to farmers?	Technological innovation has been a recurring influence in agriculture. The strategy of technology diffusion used by agrichemical companies could be adapted to diffuse sustainable management practices and technologies.	
	Are farming practices similar worldwide or do they vary widely by region?	Some countries may be nodes of BMPs that would benefit producers worldwide.	
	Are suppliers regularly audited by your firm and do suppliers regularly audit their growers to ensure environment and labor standards are adhered to?	Auditing is an easy and effective enforcement mechanism that creates incentives in the supply chain to work on sustainability.	
	Does the commodity store well or does it require immediate processing and transport for your product?	Time sensitivity in agriculture remains a significant obstacle to managing supply and demand. Technologies that can improve commodity storage and preservation can mediate price volatility and reduce bottlenecks in the supply chain.	
	Are there strong international trade bodies such as the International Coffee Organization that organize the industry's growers?	Industry institutions are strong leverage points to push sustainability initiatives broadly through the supply chain.	

	Question	Implication	Findings
Environmental	Has Rainforest Alliance, Conservation International, or similar organizations established standards for environmental practices growing this commodity?	NGOs have spearheaded sustainable agriculture campaigns over the past 20 years. They have substantial technical expertise and are trusted by end-consumers.	
	Are there urgent resource scarcity issues (water, fuel, soil quality) that will impact supply within 10 years?	Sustainable supply chains cannot be achieved quickly, so near-term resource shortages should be focused on immediately.	
	Is the commodity cultivated primarily in monoculture or polyculture?	Polyculture cultivation typically results in higher biodiversity and soil quality.	
	Is the commodity extremely water- or pesticide-intensive?	Water and pesticide application rates can be reduced through education on BMPs.	
	Is cultivation occurring primarily in existing farmland or are pristine habitats continuing to be converted to farmland?	Habitat destruction for agriculture is a major concern in subtropical and tropical regions which typically have high biodiversity	
Political/Legal	Is the commodity mostly traded on a controlled/closed market by country or a global, competitive open spot market?	Country-specific subsidies and tariffs distort prices. Typically there are insufficient incentives to get farmers to adopt sustainable growing practices.	
	What level of control/influence does the WTO exert on world trade of the commodity?	The WTO currently does not have strong environmental and social standards to complement its standards for trade and competition. Currently WTO rulings favor countries that can supply commodities at lowest cost, regardless of environmental and social impact.	
	Does your firm procure this commodity in countries that have formal and informal institutions to ensure transparency and anti-corruption?	Corruption is a legal and reputational risk to your firm. Many agricultural commodities are grown in LDCs with weak and even corrupt governance.	
	How do the local legal standards for environmental and labor performance compare to your firm's standards?	Countries with laws less stringent than your own likely will require extra auditing and incentives for sustainable supply chain activities to ensure compliance.	

The SASCA framework

The SASCA framework includes both factors within the supply chain – such as the firm, suppliers, vendors, and consumers, and factors outside the supply chain – social, technological, environmental, and political factors. When stepping through the framework, one should quickly answer the questions; detailed answers are not necessary. After answering the questions, look at each box and review your answers against the implications column. I have adopted a red, yellow, green categorization scheme to sort through areas of opportunity, areas needing development, and potential barriers to sustainable supply chain work. The red, yellow, green assessment categories are adopted from a process used by Wal-Mart to compare its suppliers' compliance with its labor standards (Wal-Mart, 2006). The categorization process is easily applied to the objectives of the SASCA framework.

For categories where all the questions are answered 'positively,' that is, in support of sustainable supply chains, you may color code the category green. These factors support sustainable supply chain work and may even present an opportunity. For categories where your answers are a mix of both positive and negative implications, flag these boxes yellow in the framework. These are areas where you have some obstacles, but may still be able to push through progress. Finally, for categories in the framework where the majority of answers have a 'negative' sustainable supply chain implication, flag these boxes red in the framework. These may be roadblocks to sustainable supply chain work that you cannot control.

The SASCA framework assesses only the environmental and social sustainability issues of a supply chain. Therefore, any conclusions drawn from SASCA must be couched within the larger context of a company's supply chain performance and overall corporate strategy. When evaluating supply chain sustainability, you must consider the interplay of sustainability initiatives with other integral supply chain performance measures such as capacity, reliability, and distribution.

CASE STUDIES BACKGROUND: THE BEVERAGE COMPANY AND SUSTAINABILITY

The Beverage Company (TBC) is a large beverage company and has an extensive distribution system in the world. Interbrand consistently ranks TBC as one of the world's most valuable brand. Though started in the US, today 80 percent of company revenues occur outside North America. The firm employs a local-global strategy, making operations cater to local conditions, tastes, and infrastructure, while maintaining a uniform brand identity globally. Contrary to conventional wisdom, TBC's products are mostly sourced, produced, and distributed locally by local staff.

In 2005 the CEO unveiled a new corporate strategy that outlines the company's goal to attain sustainable growth by measuring its performance in five areas -- its profitability, portfolio (product variety), partners (regional bottlers), people (employees), and the planet. This has significantly shifted the Company's attitude towards CSR and sustainability work, since it is now integrated with corporate strategy. As a result, TBC has built a strong corporate CSR team and now employees throughout the company are aware and interested in sustainability challenges for the Company.

In 2004, responsible procurement in supply chains emerged as an area of Company concern. In ensuing years TBC examined its product portfolio and began assessing what supply chains had serious environmental and social impacts that needed to be addressed. In addition to looking for potential supply chain risks, the Company also was seeking potential opportunities to market sustainable brands, since this was a growing consumer base.

In 2006, I interned with the Director of Corporate Responsibility at TBC. During my three months supporting the Director, I had the opportunity to engage in three sustainable supply chain initiatives, participating in cross-functional teams that included several internal company professionals as well as NGO experts in sustainable agriculture and CSR. The subsequent case studies draw from experiences working on sustainability of the sugar, orange juice, and coffee supply chains of TBC.

Each case study that follows begins with an overview of the commodity, a description of the production process and the most significant environmental and social impacts related to the on-farm and processing steps of the supply chain. A discussion on historical and recent market conditions follows, detailing supply/demand issues and consumer trends. I then apply the SASCA framework to the commodity, designating each box of the table as red, yellow, or green based on answers to the SASCA questions. After showing the results of the SASCA in a table, a summary section follows, highlighting serious obstacles (red), areas of difficulty (yellow), and instances for sustainability opportunities (green).

CASE STUDY: SUGARCANE

Overview

Sugarcane is produced in 130 countries with tropical lowland climates, most significantly in Brazil and India (UN FAO, 2002). It is consumed around the world, with 30% of sugar production traded internationally. Sugar consumption is increasing globally at the rate of two million tons per year because it is a key ingredient in many processed food and drinks that correlate to increased disposable income and economic growth (WWF, 2004). Table 3 provides summary statistics of sugar production and trade worldwide.

Table 3. Overview of Sugarcane Production and Trade (Clay, 2004).

Production Data			International Trade Data	
Area under cultivation	19.6 Million ha		Exports	35.0 Million MT
Global production	142 Million MT (beet and cane)		Share of world production internationally traded	30%
Average yield	64,071 kg sugarcane/ha			
Producer price	$21/MT		Average price	$229/MT
Producer value	$26,217 Million		Value of globally traded cane	$8,016 Million

Production process

Given its ancient roots, sugar production systems are mature and little innovation occurs today. However, production does vary significantly in different regions based on rainfall amounts, patterns of landholding, and extent of technology use.

After harvest, sugarcane must be transported to a mill within 24-48 hours in order to maximize yield. The farmers are paid by the mill, or processor, based on the quality of the cane. Once processed, sugar mills sell product to suppliers, distributors, wholesalers, or traders. Three grades of sugar can be extracted from cane: whole raw,

raw, and refined, the white crystals used in most processed foods (Transfair, 2003). While there is an oversupply of sugar in aggregate, when evaluating the availability of the three different grades within different geographic regions, there are situations of insufficient supply as well, especially for refined sugar.

Customers of sugar are primarily food and beverage firms that secure contracts to ensure just-in-time delivery of product. Therefore, wholesalers, traders, and distributors tend to hold onto product and disburse it only when required by the customers.

Environmental problems

Agriculture is the largest use of water (69% of freshwater supplies) in the world; and sugar is one of the most water-intensive crops (Gleick, 2000). Where rainfall is insufficient, surface irrigation is the most affordable but also most inefficient form of irrigation, with only 70% of water lost in evaporation or misapplication in some parts of the world (Pimentel et al., 2004). Water intensity at the mill is also high, as water is used for washing, boiling and evaporating sugar juice, and cleaning equipment. Biannually mills are thoroughly washed, which creates a major peak in organic matter loads on the receiving waterbodies (Clay, 2004). This practice can create anoxic conditions, leading to massive fish kills.

Because sugar is a tropical plant, much of the lands cleared for cultivation were once unique, biodiverse ecosystems. Tropical forests, natural habitat on islands, and coastal wetlands have been cleared for nearly 500 years to make way for sugar cultivation. A WWF report conjectures that sugarcane may be responsible for more loss of biodiversity on the planet than any other single crop (WWF, 2004).

Social problems

Sugar farming has been described as one of the most hazardous forms of labor by Human Rights Watch (Human Rights Watch, 2004). In Northeast Brazil, sugarcane workers have lower life expectancies and higher infant mortality rates than counterparts

in other occupations of the region (Clay, 2004). Given the labor intensity of farming, farm laborers face occupational hazards from production equipment like machetes, natural threats like heat exhaustion and dehydration. In countries where the field is burned prior to harvest, laborers are exposed to harmful air pollutants like dioxins.

Beyond the dangers of sugar cultivation, international prices plummeted in the 1960s, leading to collapse of the industry. Since then sugar has remained an unpredictable commodity in the market, resulting in low wages and low job security for laborers. Sugar prices are often so low that farmers cannot cover production costs, let alone feed their families or make a profit (Transfair, 2003).

Market conditions

Forty years after its collapse, the sugar industry remains volatile in spite of rapidly increasing supply and demand. The price declines shown in Table 4 are due to an oversupply of sugar in the world market that has occurred as developing countries have increased production while developed countries have sustained production levels.

Table 4. Changes in world sugar market from 1961-2002 (UN FAO, 2002)

World production	Increased 181%
International trading	Increased 70%
Real Prices (adjusted for inflation)	Declined 46%

Continued production in developed countries, especially the US and EU countries, is made possible by government subsidies and trade tariffs and quotas. In the 1980s, industrialized countries imported nearly half of the world's globally traded sugar. In contrast, today these same countries have become net exporters of sugar due to domestic producer subsidies (WWF, 2005).

Sugarcane also faces more competition from other substitutes today than prior to the 1960s. Artificial sweeteners, corn syrup, and other natural sweeteners all are adequate substitutes that make it possible for non-tropical countries to produce their own

sweeteners. Further, beet sugar also competes with sugarcane production in the commodity market, comprising nearly 30% of global sugar production (WWF, 2006).

The trade policies of countries play a significant role in affecting local prices and availability of sugar. In the US, Americans may pay double to four times more for domestically produced sugar than prices available on the world market (Clay, J., 2004). The EU and US, principal importers of sugar, exert significant influence on world market prices based on their domestic tariffs and quotas. Only three of 130 producing countries – Australia, Brazil, and Cuba, operate at competitive world market prices (WWF, 2006). Therefore the vast majority of sugar is sold domestically at inflated prices to consumers. Government subsidies and tariffs distort supply and demand signals in the commodity's trading and may encourage farmers to continue producing sugar even if they are less efficient growers. In the case of sugar, government tariffs have protected sugar growers in the temperate climates of the US and EU, even though sugar is best grown in tropical, precipitation-heavy conditions. With such major price distortions in the commodity's market, it is not surprising that world sugar prices are highly volatile.

In recent years, the rise in crude oil prices has directly increased costs for sugar production, driving up prices worldwide. In addition, increased interest in ethanol, an alternative product of sugar cultivation, has dampened supply to the sugar market. In 2005, for example, as much as 50% of sugarcane production was devoted to ethanol production (OECD, 2005). As a result, despite historical trends of decreasing prices, 2005-06 marked a 23 year high in world sugar prices and the third consecutive year of a supply deficit (UN FAO, 2006).

The detailed SASCA analysis for sugar has been withheld from the public version of this document; but a summary of the analysis results follows.

The Beverage Company and sustainable sugar

TBC relies on water and sugar as key ingredients in virtually all of its products. Further, TBC, as a highly visible branded firm, relies heavily on positive consumer perceptions of

the company and its products. Corporate responsibility in social and environmental performance, therefore, is central to the company's overall brand management. Given sugar's significant social and environmental effects, in 2003, the firm began investigating opportunities for making its sugar supply chain more sustainable so as to meet its corporate citizenship goals and satisfy stakeholder and consumer growing expectations of corporate sustainability.

Although the company designated several staff at headquarters to focus more closely on the sugar supply chain, this group has faced significant barriers to implementing change in the past four years. Reviewing the results of the SASCA analysis reveals why sugar's supply chain has major roadblocks to sustainability, but also illustrates what the firm can begin doing now to shift toward better sugar practices.

Roadblocks and red alerts:

The political/legal context of global sugar cultivation is dominated by governments' trade protections. Government policies are perhaps the most intractable barrier to greening the sugar supply chain. Better management practices (BMPs) are cultivation practices such as integrated pest management and no-till farming, which are alternatives to the traditional practices that are more damaging to the environment. However, BMPs are virtually impossible to implement when there are insufficient incentives for farmers to change practices that won't fetch them a higher price than what is guaranteed by the government. Country-specific laws for sugar are one reason why The Beverage Company System employs a local procurement strategy, another major roadblock to creating a sustainable sugar supply chain. The SASCA analysis reveals that the firm's value chain activities dilute its leverage in the sugar supply chain because of local sourcing. Centralized procurement could improve its bargaining position in the sugar supply chain, but the reality is that there are numerous advantages to sourcing locally not considered in this analysis.

Proceed with caution – yellow lights

Suppliers currently have the strongest leverage in the sugar supply chain because the market's demand exceeds supply and they may also sell to the ethanol market, which is experiencing rapid growth. However, TBC's sugar quality standard is so high, that in many regions it works with only a few suppliers that have developed the quality assurance practices to meet TBC specifications. Given that these suppliers already have tailored their production to meet TBC expectations, there may be opportunity to collaborate with these suppliers and begin investigating BMPs.

WWF and TransFair have developed standards and BMPs for sugar cultivation (WWF, 2003; TransFair, 2003). While there is no industry-recognized certification body recommending best practices for environmental and social impact, the knowledge has been collected and TBC could begin gathering information and working with one or two high performance suppliers on pilot projects of the environmental and social BMPs. Given the social risks involved with child labor in sugar cultivation, it is advisable for TBC to proactively engage in social justice improvements in the sugar supply chain. More advanced growers, such as those in Brazil, may be good candidates to launch pilot projects.

Green light – go for the opportunity

The SASCA technological analysis shows that technical BMPs and equipment have not been broadly adopted by the industry. Brazil has well-developed technologies and practices that make sugar cultivation water and energy efficient. TBC has very strong relationships with Brazil's sugar suppliers and should work with them to start doing technical outreach and education to growers in countries with weaker sugar industry knowledge and technologies.

CASE STUDY: ORANGE JUICE

Overview

Oranges are the most produced fruit in the world – comprising 22.5% of global fruit production. Oranges grown for orange juice production is dominated by Brazil and the US, which together produce 87% of frozen concentrate juice world market (UN FAO, 2002). Other major producing countries include Mexico, China, India, and Spain. Orange juice is consumed around the world, with the US consuming roughly half of the world's orange juice production. Other major importing countries are Germany and the rest of the EU, Japan, Canada, and South Korea. Many countries like Brazil, Mexico, and India, have relative parity between consumption and production; and therefore are not importers of orange juice. Table 5 summarizes global production and trade data for orange juice.

Table 5. Overview of orange juice production and trade (Clay, 2004).

Production Data			**International Trade Data**	
Area under cultivation	3.6 Million ha		Exports	8.1 Million MT
Global production	62.4 Million MT		Share of world production internationally traded	13%
Average yield	17,330 kg/ha			
Producer price	$219/MT		Average price	$579/MT
Producer value	$13,662 Million		Value of globally traded cane	$4,691 Million

Production process

Oranges are produced in large monocrop plantations, typically owned and operated by suppliers. Orange seedlings mature in 5-7 years and typically yield fruit at sufficient quality and quantities for 30 years thereafter. Payback time is roughly 10 years.

Orange production is fairly fertilizer-intensive and pesticide-intensive. Trees are sprayed several times a year to avoid insect damage and mold. In Brazil, orange trees use more pesticides per hectare than any other crop (Neves et al., 2001). Other maintenance tasks for orange production include ground cover, maintenance of irrigation systems, and pruning of branches annually. Oranges are typically harvested by hand and then consolidated into wooden boxes and transported by truck.

Trucks take fresh oranges to a processing facility within 24 hours of harvest. The processing facilities press the oranges to maximize juice recovery. Once processed, orange juice may be sold fresh, fresh frozen (not-from-concentrate), pasteurized, fresh concentrate, or in frozen concentrate forms. Concentrate is produced by evaporating the water content of the juice down from 89% to 34%. Most internationally traded juice, including all “Orange Brand “ juices, are frozen concentrate, and may be a mix of juice from multiple farms and even multiple countries. Further, some orange juice blends tangerine and other fruits in order to reach specified color requirements.

In addition to orange juice, orange processing may also generate numerous coproducts such as fresh oranges for human consumption, pulp waste used as animal feed pellets or soil fertilizer, essential oils from the rind, pesticide applications using the seeds’ antibacterial and fungicidal properties, and pectin, a product added to jams and jellies. These coproducts work to increase the overall economic value of oranges and also minimize solid waste generated in the supply chain.

Environmental problems

While orange cultivation results in environmental damages similar to all agricultural production, the most notable environmental impacts are that of habitat conversion and the degradation of soil and water quality related to intensive agrochemical use.

Much of the land converted to orange cultivation in Florida and Brazil were once tropical ecosystems with a high value of biodiversity. By now, these lands have been converted for several decades and the damage to habitat occurred in the 1980s or earlier. However, newer producing countries like Belize are undergoing the same habitat destruction now (Barham, 1992). Worse, Belize is using hillside plantings, which are not as productive or environmentally sustainable as level fields. To achieve acceptable yields on hillside plantings farmers apply even more pesticides and more fertilizers.

Orange production uses a large variety of pesticides, typically applied to clean fields. Clean field techniques require that the monoculture fields are completely cleared of all other crops, which drives down the carbon content of the field's soil (Barham, 1992). The clean fields approach coupled with intensive pesticide application result in a positive feedback loop that accelerates degradation of the soil quality and water runoff.

Social problems

The most recent social controversy in the orange juice industry was the discovery of a slave ring run out of Lake Placid, FL in 2004. The Ramon brothers had been supplying roughly 700 workers, all illegal immigrants from Mexico, to local fruit growers for hand-harvesting labor (FBI, 2004). Though not slavery in the traditional sense, these workers were forced to pick fruit for ten hours a day, six days a week, with no time off. They were given squalid, overcrowded housing and threatened at gunpoint if they tried to escape. The incident illustrates the challenge and risk the orange industry faces in finding affordable labor for hand-picked harvesting.

Market conditions

Overall, orange juice demand has steadily increased in the past 50 years, although growth has leveled off in recent years. The main customers on a global basis of orange juice are PepsiCo (Tropicana), TBC ("Orange Brand"), and supermarket chains, retail foodservice providers, and institutional buyers that market orange juice under private

labels. These customers tend to work directly with orange juice companies on a longer term, contractual basis.

Today orange juice, on a per gallon basis, is more expensive than reformulated gasoline today (roughly $5.00/gallon). Prices have been rising primarily due to rising fuel costs and a gradual decline in supply. Orange processing is energy intensive, and therefore sensitive to fuel costs. Further, fresh orange juice such as Tropicana is very costly to transport due to the heavy water weight, so changes in fuel prices significantly drive up operating costs.

The other factor driving up prices in the US is the gradual decline of domestic supply. Florida citrus growers have been divesting themselves of their orange groves because the real estate value of the land now exceeds the value of their orange cultivating business. The decline of US production has concentrated even more power in Brazil for setting prices and modulating world supply/demand balance.

Consumer preference shifts toward healthier, lower sugar drinks has pressured orange juice retailers to innovate beyond the pure product. Current innovations include health additives such as phytosterols, fruit juice blends such as orange-tangerine, and low calorie/low sugar options. Sustainable or eco-branding is another alternative approach to product differentiation and innovation.

The detailed SASCA analysis for oranges has been withheld from the public version of this document; but a summary of the analysis results follows.

The Beverage Company and sustainable orange juice

The Beverage Company's "Orange Brand" is one of the world's largest customers of the orange juice supply chain. The most recent social controversy in the orange juice industry was the discovery of a slave ring run out of Lake Placid, FL in 2004. Though not slavery in the traditional sense, 700 illegal Mexican workers were forced to pick fruit for ten hours a day, six days a week, with no time off. They were given squalid, overcrowded housing and threatened at gunpoint if they tried to escape. The industry responded with increased intensity and frequency of on-farm audits. To date, no further violations have been reported. Nevertheless, the incident illustrates the challenge and risk the orange industry faces in finding affordable labor for hand-picked harvesting.

The slavery ring bust in Florida drew corporate attention to farm conditions and labor issues in the citrus supply chain. In response, the company's Global Procurement team and Global Labor teams have worked closely together to increase the frequency and scrutiny of on-farm audits of the brand's suppliers. The SASCA analysis shows that the orange supply chain is a good candidate for sustainability investments, but there will be some challenges.

Roadblocks and red alerts:

None

Proceed with caution – yellow lights

In the orange supply chain, suppliers currently have the most leverage, as shown in the SASCA analysis. They are consolidated, privately owned, and vertically integrated from farm to processing. Further, orange supply overall is diminishing due to closures of Florida farms. Therefore, one major challenge to implementing sustainability initiatives in the orange supply chain will be garnering buy-in from the major suppliers.

One advantage of having suppliers vertically integrated is that TBC has more access and visibility to farms. It has been able to audit suppliers and their landholdings directly

to ensure that labor standards are adhered to. Supplier-controlled farms are less likely to use child labor, but as mentioned previously, the hazards of underpaid or poorly treated day labor is high risk.

The orange juice market is another area of potential concern for pursuing a sustainable supply chain. Overall consumer demand has stagnated and rising fuel costs have greatly eroded orange juice profitability. It may be difficult to initiate cost-adding sustainability initiatives during a period when the entire supply chain's profitability has shrunk.

Perhaps the biggest area for improvement revealed in the SASCA analysis is the environmental practices of orange cultivation. While farms have developed technologies for efficient irrigation, there still is excessive agrichemical use. TBC can look at Rainforest Alliance's guidelines for orange cultivation to identify BMPs that minimize pesticide application. Supplier resistance is expected, since disease is a major risk in orange cultivation. However, TBC may be able to work with Cutrale or others to launch one or two pilot project farms that attempt to minimize agrichemical use through BMPs.

Green light – go for the opportunity

The SASCA analysis shows that one of the biggest strengths to pursuing a sustainable orange supply chain is the alignment of firm interests cross-functionally. From the beginning, the brand's leaders supported the principles of sustainable supply chains. TBC procurement strategy for "Orange Brand" is negotiated entirely by corporate headquarters' Global Procurement, strengthening the company's buyer power. TBC deals with only a small handful of orange juice suppliers, making communications along the supply chain more streamlined. The cooperation of cross-functional units within the firm is a significant asset for sustainable supply chain work.

Orange juice vendors and consumers were another area of opportunity highlighted in the SASCA analysis. Consumers are seeking differentiation in orange juice through new flavors, health additives, and low-calorie options. There are niche brands that do fetch a

price premium; therefore there is a possibility that “Orange Brand” could extract a price premium for selling sustainably sourced orange juice.

The orange juice industry to date has no third-party certification labels or eco-standards. FLO and Rainforest Alliance’s standards are applied to orange farms that produce directly for fruit consumption, which is somewhat different from orange cultivation for orange juice. TBC could gain a first-mover advantage by creating its own internal standard, or it could initiate talks of creating an industry-wide standard.

Technologically, orange suppliers have already developed BMPs for energy and water efficiency and invest in R&D. Therefore there is precedent for technology innovation and diffusion that could be adapted for sustainability purposes.

CASE STUDY: COFFEE

Overview

Coffee is produced in roughly 80 tropical and subtropical countries. Brazil is the leading producing country, but relative to other commodities coffee production is less concentrated globally (see Figure 6). The world has an estimated 2 billion regular coffee drinkers, with Europeans consuming 40% of globally traded coffee and the US consuming another 25% (Mintel, 2006). Producing countries are also leading consumers of coffee. Table 8 gives summary data on the global coffee industry.

Table 6. Overview of coffee production and trade (Clay, 2004)

Production Data			International Trade Data	
Area under cultivation	10.6 Million ha		Exports	5.6 Million MT
Global production	7.4 Million MT		Share of world production internationally traded	76%
Average yield	698 kg/ha			
Producer price	$1,130/MT		Average price	$1,510/MT
Producer value	$8,362 Million		Value of globally traded coffee	$8,441 Million

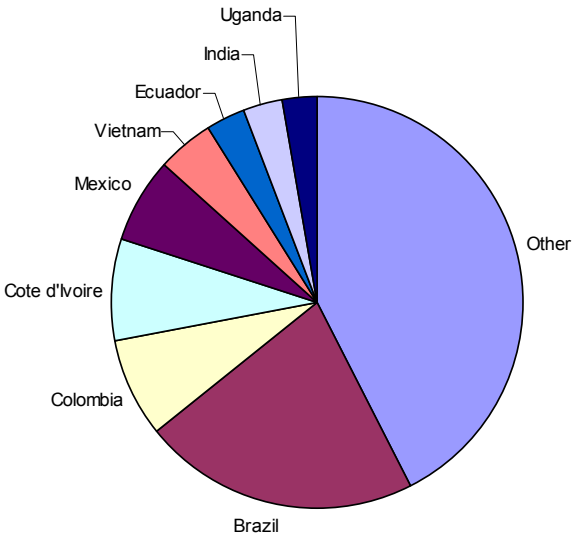

Figure 6. Global coffee production (by area under cultivation) (Clay, 2004).

Production process

Coffee grows best in tropical climates with moderate sunshine and rainfall. Coffee shrubs mature about three years after planting, yielding 2 harvests per year. One mature tree yields roughly 1 pound of roasted coffee on an annual basis. Coffee grown in full sun has a 6-8 year productive life, whereas shade-grown coffee trees are productive for 18-24 years. In both cases, coffee is a much longer term investment than other similar crops that grow to maturity in 2-4 years (Barry, 2003).

While coffee is easy to grow, it is highly vulnerable to disease and pest problems. Farmers typically make cultivation decisions based on the local value of labor versus land. For example, on small holdings of less than 5 hectares, which comprise over half of global production today, farmers commonly substitute unpaid family labor for expensive chemical treatment. However, for larger producers, government subsidies and encouragement from agricultural agencies have spurred the expansion of technology-intensive cultivation that relies on extensive fertilizer, pesticide, and herbicide use (Rappole et al., 2003). Coffee berries are typically harvested and sorted by hand, although both steps are done mechanically on farms with larger capital resources.

After harvest, farmers bring their berries to a processing facility for depulping, hulling, fermenting, and drying. Once dried, beans are sorted and farmers are paid according to the grade or quality of their beans.

Roasters in consuming countries typically buy large volumes of coffee at specified grades from exporters, who consolidate smaller batches of coffee provided by regional cooperatives. Coffee experts then create blends to satisfy varying consumer tastes around the world.

Environmental problems

A major concern with coffee cultivation is the conversion of primary tropical habitat into agricultural lands, compromising biodiversity and conservation of pristine lands. In

studies in Colombia and Mexico, as much as 90% of bird species were lost once land was converted to full-sun plantations (Moguel and Toledo, 1999). Coffee cultivation is still expanding into pristine environments in countries such as Vietnam, Papua New Guinea, Laos, Myanmar, and Mexico. Other countries, like Colombia, Indonesia, and the Parana region in Brazil are adopting full-sun cultivation over shade-grown techniques, further diminishing the wildlife supporting capacity of the agroecosystems (Moguel and Toledo, 1999).

Agrichemical use also creates pollution problems in soil and ensuing water runoff, which can create nutrient imbalances in waterways and release carcinogens and other chemicals into the environment that threaten ecological and human health. In the 20th century, PCBs such as benzene hexachloride (BHC) and lindane were used to combat rust, a leaf disease that ruins coffee crops. Numerous chemical poisonings of workers were documented at the time, and subsequently such persistent, bioaccumulative chemicals have been banned from production (May et al., 1993). Their persistence and impact in the surrounding natural environment remains poorly researched to this day.

Social problems

The value extracted in coffee producing countries is a modest fraction of the margins achieved by the consuming country supply chain players. In 1985, $0.38 of every dollar spent on retail coffee in the US went back to producing countries. However, after dissolution of the International Coffee Agreement in 1990, real prices of globally traded coffee began declining, further eroding profitability for coffee farmers. In 1995, the fraction returning from US coffee retail to producing countries had declined to just $0.23 of every dollar. In a time period where the real retail prices of coffee had increased in the US by roughly 30%, producing countries' portion of the proceeds declined by 40% (Clay, 2004). Figure 7 shows an example of the inequitable distribution of profits in the Ugandan coffee supply chain.

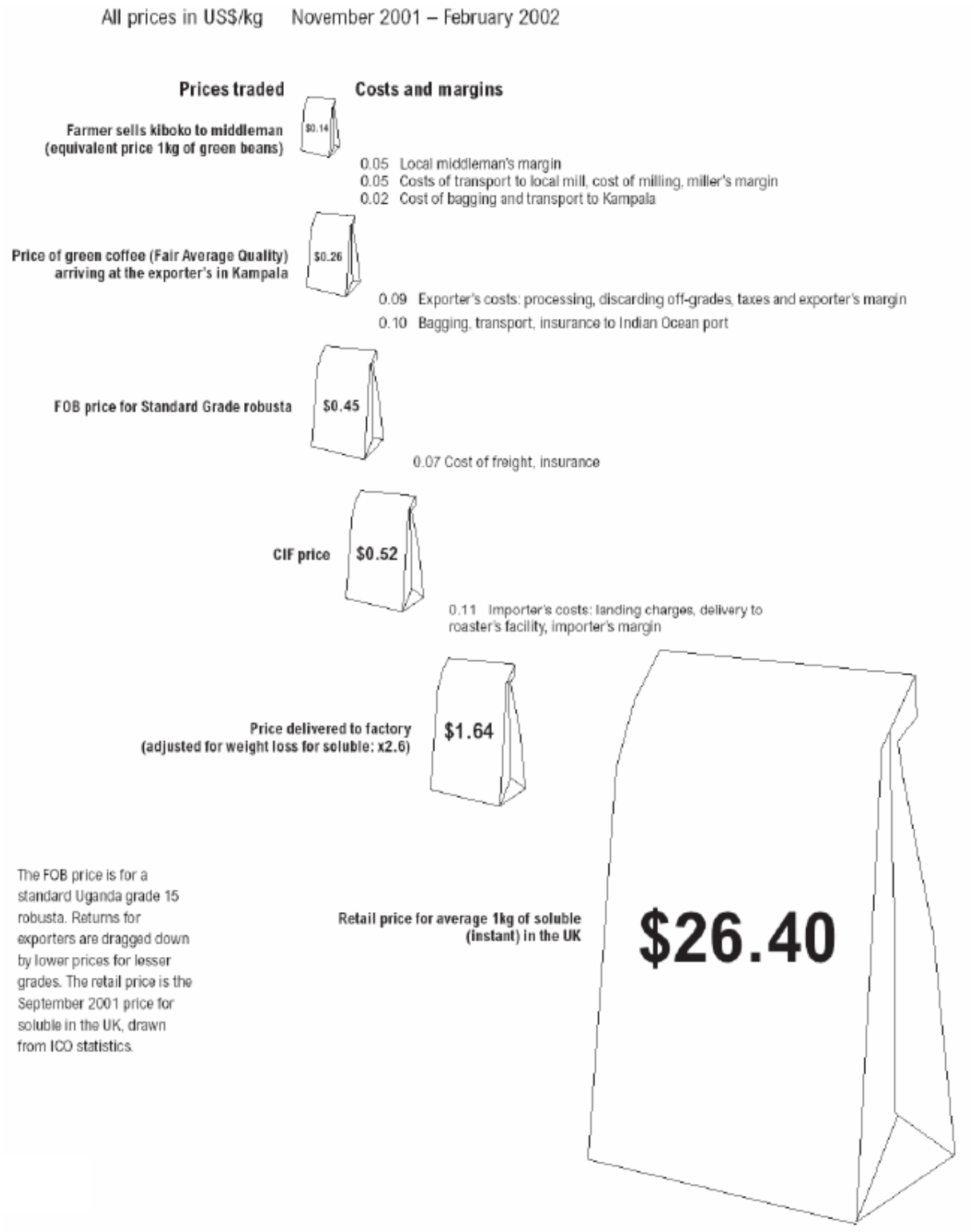

Figure 7: Tracking profit margins through the coffee supply chain (Oxfam, 2002)

Market conditions

Coffee is the world's second most traded commodity after oil, with many producing countries and consuming countries involved in global trade. Coffee prices are highly volatile given the product's sensitivity to unpredictable conditions such as disease and weather. Overall, global supply is on the rise even though total demand is declining. The opposite case is true for specialty coffee, however, where customer demand has steadily risen and in some cases coffee supply has been unable to keep pace (Mintel, 2006). An interesting distortion results, where the US volume demand for coffee is declining in spite of increased spending on coffee (Mintel, 2006). Starbucks deserves a lot of credit for transforming specialty coffee from a niche product within the traditional coffee sector into its own market segment which now accounts for more than 10% of global output and is forecast to grow as much as 15% per year in the near future (McCewan and Allgood, 2001).

The detailed SASCA analysis for coffee has been withheld from the public version of this document; but a summary of the analysis results follows.

The Beverage Company and sustainable coffee

The Beverage Company launched a new coffee brand in the autumn of 2006 in select locations. TBC, in response to predicted 10-15% growth in premium tea and coffee consumption, sought to develop a new brand that reached the specialty coffee market segment not currently addressed with its brewed beverages brands.

The coffee brand team contacted individuals working in the Environment and Water Resources department and Global Labor and Relations group of TBC roughly nine months prior to launch. The brand team wanted to make "Coffee Brand" as "green" a brand as possible, from the product itself to the marketing strategy. The brand team added sustainable packaging, energy efficiency, and global labor experts to their core team in order to incorporate sustainable features where feasible. Some of the most

significant decisions the brand team made were: the decision to include several certified organic and certified fair-trade coffee blends in the product offerings, to use packaging with high recycled content, and to operate concept stores with waste minimization management.

While the long term success of “Coffee Brand” is not certain, its short term efforts in creating a more sustainable agricultural supply chain appear successful. The SASCA analysis reveals why the set of industry value chain conditions and macroenvironmental factors made sustainable supply chain work possible in this particular situation.

Roadblocks and red alerts:
None

Yellow light – proceed with caution:

The external institutional factors in the SASCA analysis were all evaluated as yellow, indicating obstacles, but no intractable issues. TBC benefits from entering the specialty coffee market later because by now third-party certification bodies and standards have been developed and in practice for several years. Consumer awareness of coffee’s environmental and social impacts is also much higher than is the case for other TBC ingredients.

Green light – go for the opportunity:

The SASCA analysis of the firm, suppliers, and customers all indicate that the company has an opportunity to improve the sustainability of the coffee supply chain with their “Coffee Brand.” One of the advantages of launching a new brand in a fairly new beverage category for the firm is that there are fewer entrenched norms and expectations within the supply chain and with end-consumers. Because TBC has little presence in the premium coffee category, “Coffee Brand” has the opportunity to define the brand more independently of company history than pre-existing brands. The specialty coffee sector is also an ideal niche market where TBC can extract a price

premium from socially conscious consumers that helps absorb the higher costs of certified supplies.

The exercise of including sustainability experts into brand development and product launch represented a new process for the company. The impacts on TBC's employees, internal procedures and norms for brand management, and attitudes concerning sustainability beyond core CSR staff may have lasting effects. The "Coffee Brand" experience could lay the groundwork for future brand teams to address supply chain sustainability through collaboration with company experts on environmental and social issues. At the very least, the "Coffee Brand" case was a useful learning experience for its marketers and sustainability experts to interact and better understand the opportunities and limitations of sustainable activities, remaining grounded in TBC's core mission – to provide beverages that meet consumers' needs.

ADDITIONAL FINDINGS

My case studies highlight projects with The Beverage Company and are the focus of this practicum. However, from working with Price-mart's Global Procurement team in Chile I also identified some valuable leverage points for sustainable supply chains that are not raised in the SASCA framework because they are not directly relevant to TBC. I present these additional findings here as ancillary results from my research.

Sustainability and product quality: Tying sustainability into product quality is an easy way to utilize traditional mechanisms of supply chain management to improve the sustainability of the supply chain. Shade-grown coffee and organic coffee, for example, earn higher quality scores than traditional coffee (Treter, 2007). Supply chain managers are trained to pursue higher quality, so they will naturally seek sustainably-grown agriculture if this indeed improves quality. A link between quality and sustainability will often justify a price premium as well.

Food safety: As food production has become increasingly global, the importance of food safety has become a priority in the industry. In recent years, food scares such as avian flu in poultry, E. coli in spinach, and BSE ("mad cow disease") in beef have damaged industry reputations and frightened consumers. The measures taken to ensure food safety are very similar to those required to ensure ethical labor standards are adhered to on the farm and in processing plants (Batra et al., 2006). Hygiene measures such as making sanitation facilities available, providing regular break times, and ensuring the health of farm workers meet both the goals of food safety and sustainable labor practices.

Food security: Since 9/11 the US Department of Homeland Security has identified the food supply chain as a major potential target for terrorism and has increased expectations of security measures industry-wide. Investments into "smart" shipping containers and RFID-labeled pallets are intended to improve the traceability of the supply chain (Batra et al., 2006). Traceability will help firms quickly identify

contaminated food sources and remove product from the shelf before a terrorist event breaks. Investments into traceability technologies also have the added benefit of improving visibility of the supply chain for sustainability purposes. Higher visibility will allow a firm to quickly identify farms found to have unacceptably high pesticide levels, for example.

Cooperation with competition: In a break with traditional business strategy is that, when creating sustainable supply chain standards, your competitors becomes complements, or allies (Ahuja, 2007). If standards have broad buy-in from the industry, it protects you from putting your firm at a potential competitive disadvantage. Assuming a standard has 'teeth', more members adhering to such standards mean more on-the-ground social and environmental improvements. In order to protect companies from anti-competition liability (collusion), the presence of third parties like NGOs is essential to mediate these dialogues.

As an example of successful industry collaboration, when the entire chemical industry suffered significant negative publicity after the Bhopal disaster, representatives from virtually all major chemical companies met and formed Responsible Care, a voluntary program whose members commit to improve their performances in the fields of environmental protection, occupational safety and health protection, plant safety, product stewardship and logistics (King and Lenox, 2007). Responsible Care, whose members comprise 90% of the chemical industry, became a valuable program *because* of its broad participation across industry competitors, thereby protecting the reputation of the industry overall (Hoffman, 2000).

Another merit of working with competitors to settle on single standards is that it reduces confusion to consumers and simplifies compliance expectations for suppliers.
When label and standards multiply, as has occurred with coffee, they each dilute their own significance and meaning as more certifications appear on the shelf. Eventually this could lead to all certifications having poor credibility and recognition with consumers (Barry, 2004). Table 7 lists prominent coffee sustainability standards. While the objectives of each certification have significant overlap, a supplier must file separate

auditing reports for each standard to prove compliance and a consumer may have poor understanding of the differences.

Table 7: Major environmental and social standards used in the coffee industry (Barry, 2004)

Standard	Sponsoring Organization	Objective of certification	Seal/logo
Organic	US Department of Agriculture	Organic coffee is cultivated without use of pesticides or other agrochemicals in order to minimize environmental impact and potentially reduce health risks for the consumer	
Fair-trade	Fairtrade Labelling Organization (FLO), TransFair	Fair-trade coffee guarantees a minimum floor price to farmers that comply with standards concerning the farm labor conditions, transparency and democracy of organizations, and commitments for community reinvestment	
CAFÉ (Coffee and Farmer Equity Practices)	Starbucks; Conservation International	CAFÉ suppliers meet criteria concerning product quality, economic accountability (transparency), social responsibility, and environmental leadership in coffee growing and coffee processing. CAFÉ has a stronger focus on the entire supply chain beyond the farm.	
Bird-friendly	Smithsonian Migratory Bird Center	Bird-friendly coffee certifies farms that promote biodiversity and protect bird habitat by using shade-grown cultivation practices	
Certified eco-label	Rainforest Alliance; Sustainable Agriculture Network	Eco-label certified farms must demonstrate activities to promote conservation. They must demonstrate continuous progress in order to retain certified status.	
Utz Kapeh	Utz Kapeh Foundation; Ahold Corporation	Utz Kapeh's objectives are protection of the workers' health, livelihood, and rights; protection of the environment, and improved record-keeping and Traceability	

CONCLUSIONS

Sustainability levers in the supply chain

While working to create sustainable supply chains may be difficult for large food and beverage firms, there are some points of leverage I identified in my research. These 'sustainability levers' can be turned to as first points of activity to motivate the supply chain into action for sustainability.

BMPs: BMPs that improve environmental and social impacts of cultivation are not widely known in agriculture. Commodities that are not vertically integrated or strongly consolidated may still have many farms using inefficient cultivation techniques, as is the case with sugar, where pesticide application is often applied beyond recommended rates, or broad spectrum formulations are used instead of targeted pesticides (Clay, 2004). Launching educational programs through suppliers can be an effective means for diffusing BMPs and minimizing environmental impacts on the farm. Where a cooperative relationship between mill and farmers is present, the processing mill may be an effective point of contact for BMP outreach, since it is a point where all farmers of a region go periodically to deliver their harvests.

Nestle, for example, works with its suppliers to distribute technical support and agricultural materials to coffee growers in its Partners' Blend Programme, using the processing mill as the point of outreach (Nestle, 2006). It has also established the Sustainable Agriculture Initiative Nestle (SAIN), which serves as a technical support center for Nestle producers, providing access to technical experts and information on BMPs.

Consumer expectations: Consumers may serve more as a stick than carrot for company reputation with respect to sustainable supply chains. As indicated in the UNEP marketing report, consumers indicated a willingness to switch brands or to boycott a company on the grounds of its ethical performance (UNEP, 2005). A PRiSM survey of 300 US consumers also highlighted the leverage of consumer expectations to drive

sustainability into the supply chain. Sixty-seven percent of respondents agreed or strongly agreed that companies should "improve their environmental and labor practices, even when it results in more expensive products." When asked specifically about the food and beverage industry, roughly 40% disagreed or strongly disagreed that "most food and beverage companies have responsible environmental and labor practices" (PRiSM, 2006). The PRiSM survey highlights the gap between consumer expectations and the perceived performance of the food and beverage industry against those expectations.

It is important to distinguish between executing sustainable supply chain work in operations from publicly marketing products for their sustainable supply chain attributes. A point of consideration when prioritizing sustainable supply chain work is your brand identity. Marketing a firm or brand for its sustainable supply chain practices is unlikely to fetch a price premium for existing mainstream brands like Beverage-Cola. An entirely new brand or a brand extension targeted at LOHAS consumers is more likely to reap profits from marketing as a sustainability-minded brand.

Breaking conventions of the traditional supply chain: Aligning incentives

Another insight gained through my research is that the conventions of traditional supply chain management often contradict the objectives of sustainable supply chain management. For example, traditionally supply chain management focuses on pushing inventory and costs back onto your suppliers, with the goal being to appropriate the most value out of the supply chain for your own firm. Creating a sustainable supply chain, in contrast, requires open and cooperative relationships among supply chain players. One of the biggest challenges to sustainable supply chain work is aligning the incentives of all supply chain players so that they work together on improving environmental and social outcomes (Dolsak & Ostrom, 2003; Sustainability Institute, 2003).

One extreme example of contradicting incentives is the one-gallon jar of Vlasic pickles that Wal-Mart priced at $2.97 in 1998, leaving just a 1-2 cent profit margin for both

Vlasic and Wal-Mart. The actual price of $2.97 bore no reflection on pickle supply, demand, or production cost. The one-gallon jar quickly became a devastating success for Vlasic; its pickle volume sales showed strong growth, but nearly 50% of its pickle profitability was driven out after just one year of the promotion. When Vlasic sought relief from the $2.97 price, Wal-Mart refused to relent, suggesting that it could leave Vlasic and find other pickle suppliers that would meet their price (Fishman, 2006). Wal-Mart's pricing tactics threatened the financial sustainability of its supplier (Vlasic), to say nothing of the supply chain's environmental and social sustainability.

One innovation in aligning supply chain incentives is organizing producers to become involved in downstream activities through investment. For example, annual global sales of chocolate are roughly $75 billion, but growers capture only 5% of that from the sale of their cocoa beans. Kuapa Kokoo, Ghana's largest cocoa cooperative, has organized its farmers to own 45% of Divine Chocolate's shares. The growers now profit from direct sales of their cocoa beans as well as shareholder returns from the downstream chocolate business (Economist, 2007). With two seats on the chocolatier's board, they can also influence downstream business decisions and ensure protection of the farmers' interests.

Clearly, aligning incentives among supply chain players is a challenging break from industry norms in agriculture, but premier companies in other industries such as Toyota and Dell have demonstrated that cooperation with suppliers can yield competitive advantages (Anupindi, 2006).

Market realities

The SASCA analysis asks many questions regarding a firm's leverage in the supply chain. If you have leverage over your suppliers, then you can pressure them to work on sustainability in the supply chain in order to remain a supplier to your firm. In the case of food and beverage firms, they should wield significant leverage in their supply chains given their profitability relative to other supply chain players.

However, another major lesson from my research is that supply and demand curves in agriculture are grossly distorted by country subsidies and tariffs protecting their own farmers. The WTO and other trade agreements are significant determinants of supply chain leverage in global agriculture. When the competitive market does not send clear price and demand signals, then too many growers may enter the market, as has been the case with coffee. Spiraling price declines result (Barry, 2004). Subsidies may also protect less efficient domestic producers, as was the case for the EU's beet sugar farmers prior to the WTO ruling. Inefficient growers are often less efficient on an environmental basis, making them a barrier to sustainable supply chains.

When subsidies do not distort supply and demand information for agricultural commodities, one must bear in mind the general balance between supply and demand. During periods when demand exceeds supply, it will be very difficult for firms to pressure suppliers into adopting sustainable supply chain practices, as is the case with sugar currently, which has an alternate market in ethanol. This need not be a roadblock, however. If your firm can establish strong relationships with your suppliers and align incentives along the supply chain, then even during periods of declining supply you can continue working on sustainable supply chain practices, as is the case with "Orange Brand " orange juice's suppliers.

Supply chain management is strategic

The most important insight from my research is that supply chain management today should be handled strategically. Sustainable supply chain management can generate value for a firm through its operations and through brand equity. Though not traditionally thought of as a customer-facing activity, consumers now have increased visibility into supply chain practices through digital media. The labor standards and environmental impacts of suppliers even one or two degrees removed from a firm's direct control in the supply chain can be tied to a firm's brand identity in the consumer's mind.

Proactively managing a firm's agricultural supply chains can help a firm protect itself from risks such as litigation for environmental or labor law violations, brand erosion due

to negative publicity, and external pressure from stakeholders or consumers to change your firm's supply chain on their terms instead of your own. When asked to name companies with poor environmental and labor practices, Nike was the second-most cited company after Wal-Mart (PRiSM, 2006). In spite of employing a nearly 100-person staff of CSR professionals and having the highest labor standards in the industry, Nike's reputation for supply chain mismanagement persists a full decade after its sweatshop controversies (Nocera, 2007).

In some cases, sustainable supply chain management may pose a growth opportunity for a firm. This may be the case when launching a niche brand toward sustainably-minded consumers that will pay a price premium for responsibly sourced supply chains. American Apparel, for example, uses the tagline "Made in downtown LA. Vertically integrated manufacturing." By pitching its t-shirts as products made by employees earning a decent living and working under healthy factory conditions (American Apparel employees earn $12/hour and receive health insurance and other benefits far beyond industry norm), American Apparel has achieved profitability 20% higher than the apparel industry average (Economist, 2007).

Finally, sustainable supply chain management will help ensure the long term security of a firm's supply, which is a major risk for agricultural commodities. After experiencing dramatic supply shortages in 2005 from their Vietnam coffee suppliers due to poor rainfall in the growing season, Nestle announced its plans to begin educating its Vietnamese coffee growers on sustainable production techniques, citing the importance of protecting their raw material supplies against adverse environmental and economic conditions (Merritt, 2007). By providing technical experts, water optimization technologies, and education, Nestle hopes to stabilize and increase its Vietnamese coffee supply in future years, creating a local supply for the rapidly growing coffee customer segment base in Southeast Asia (Mintel, 2006).

Modern agricultural commodity systems have been profoundly successful at achieving high volume productivity, which will be important to meet the world's growing population and food demands. But if one steps back and looks across a food and beverage supply

chain today, it is clear that the costs and benefits are being borne disproportionately by supply chain players, which threatens the long-term survivability of the entire supply chain. By proactively managing the environmental and social impacts of a firm's agricultural supply chains, you can reduce liability, protect and potentially enhance brand reputation, and improve the overall performance of the supply chain in the long-term.

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APPENDIX A: LIST OF SUPPLY CHAIN ORGANIZATIONS INTERVIEWED

Table A- 1: Food and beverage firms interviewed

Food and beverage firms	Departments interviewed
The Beverage Company	Environment and Water Resources
	Marketing (brand management teams)
	Global Procurement
	Global Labor Relations
	Worldwide Public Affairs and Communications
"Price-mart" Stores	Global Procurement
	Sam's Club food buyers
	Global Transportation
	Direct Imports
	Enterprise Risk Management
Chiquita (Bentonville, AR)	Wal-Mart customer management team
PepsiCo, Quaker Tropicana Gatorade (Chicago, IL)	Sustainability
Starbucks (Seattle, WA)	College Relations
McDonalds (Oak Brook, IL)	Corporate Responsibility
US Food Service (Severn, MD)	Corporate Responsibility and Sustainability

Table A- 2: Suppliers, logistics providers, shippers, and trade organizations interviewed in Chile

Suppliers	Logistics	Shippers	Trade Organizations
Aconex	APL Logistics	CSAV	ASOEX Association
Carozzi	Hellman	Maersk	Fundacion Desarollo Fruticola
DDC	Maersk Logistics		Fundacion Chile
Dole			
Greenwich			

Table A- 3: Non-profit organizations interviewed

World Wildlife Fund
Business for Social Responsibility
Transfair USA
Rainforest Alliance
Higher Grounds Roasting
Professionals for Responsible Supply Chain Management (PRiSM)