

A Triple Bottom Line Assessment of Sugar

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LFS 450

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**University of British Columbia
Food Services Project**

**A Triple Bottom Line Assessment
of Sugar**

**LFS 450
Scenario #2**

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1.0 Abstract

The University of British Columbia Food Systems is an ongoing project aimed at targeting various components of the UBC food system and providing recommendations for improvements in their sustainability. Our task was to conduct a triple bottom line assessment of product group that is purchased by the Alma Mater Society Food and Beverage Department and University of British Columbia Food Services. After communication with representatives of these organizations we decided to conduct our triple bottom line assessment of the primary sugar products used. We conducted extensive research through communication, both in person and through e-mail, with further representatives of our stakeholders, conducted online research of journal articles and various other literature sources, and investigated pricings by direct phone contact to applicable companies. We focused our research on the analysis of the sustainability from an ecologic, social, and economic lens, in order to satisfy the 'triple bottom line'. Our ecologic analysis determined that organic sugarcane (*Saccharum* spp.) production was preferable; our social analysis determined that conventional sugarcane production is fraught with negative social impacts that can be avoided by purchasing sugar beet (*Beta vulgaris*) sugar or fair trade cane sugar; our economic analysis found that organic fair trade sugar incurs a significant cost over current sugar purchased. We recommend that UBCFS and AMSFBD make a concerted effort to find an economically viable plan to convert their sugar purchases to organic fair-trade sugar.

2.0 Introduction

Our plan is to review the existing procurement guidelines of University of British Columbia Food Services (UBCFS) and the Alma Mater Society Food and Beverage Department (AMSFBD) and conduct a triple bottom line assessment of their sugar products. Using online sources, an extensive literature review and interviews with our stakeholders, we hope to provide recommendations on ways that their procurement could become more sustainable.

2.1 Defining the Problem

Historically the sugar industry has had a dark past throughout the evolution of modern civilization. Sugar was a main cause of slavery in the West Indies in the 18th century, and to this day continues to have

adverse health impacts and other negative social implications (McKenna, 2005). Acknowledging these facts, the sugar industry continues to have a thriving market throughout the world. With the help of sugar's addictive properties humans are consuming more sugar than ever before, adding to the obesity epidemic and stretching the demands on the earth by needing to grow more sugar cane and sugar beets to satisfy our society's sweet tooth.

By conducting a triple bottom line assessment on sugar, our aim is to promote sustainable purchasing throughout the UBC Food System. Sustainable purchasing is a process used to buy goods and services that evaluates on more than cost alone. Sustainable purchasing considers: best value (quality, price, service, innovation), impact on the environment, as well as the product's life cycle and social and ethical impacts. Sustainable purchasing also identifies the need the product or service fulfills. It then evaluates if the need can be met in another way and if the product or service is truly necessary (Sustainability of and Supply Management, 2010).

There are many overall benefits of sustainable purchasing on society as seen in the three pillars we will be investigating in our triple bottom line assessment which are economic, social and environmental. Some examples of benefits which come from sustainable purchasing are as follows: The main economic benefit is it encourages a local economy by supporting local suppliers which reduces costs of transportation and creates a larger market for sustainable goods and services in communities. The main benefit on social implications is it supports ethical treatment of workers worldwide by promoting worker safety, health and wellness. The most positive implication on the environment is it avoids the excessive generation of waste and pollutants through the efficient use of resources (Sustainability of and Supply Management, 2010).

2.2 Vision Statement and Identification of Value Assumption

In January 2010, UBC has officially created the UBC Sustainability Initiative, which is to “commit and promote sustainability in teaching and learning, research and campus operations” (UBC, 2010) . Our vision statement is a reflection of UBC principles guide on sustainable practice, it reminds us to make every decision with economical, social and environmental in mind. The four principles (Appendix A) will remind us importance of a sustainable food system and how that could increase the well being of our society.

One of our main concerns with the principles is taking actions that promote social justice and environmentally sustainable which in our current scenario would be to decrease the affordability of food products within UBC community. Therefore, we must not only base our decisions on the sustainability initiative but also consider their financial situation.

3.0 Methods

The purpose of our project is to conduct a triple bottom line assessment on a specific food product used by UBC/AMS food services and suggest alternatives that could improve the current sustainable practices it adopts. Community Based Research was used throughout our project, this refers to a collaboration between students, staff, faculty, and community members to help identify and solve problems within the community (Community Service Learning and Community Based Research at UBC, 2011).

Preliminary Research

We were able to obtain information from the Vista website that help us understand some guidelines and requirements suggested by various sources to help define a sustainable food system. We find the UVIC quadruple bottom line chart very applicable to our case as it outlines aspects of how the decisions and practices of firms/organizations could impact the well-being of the society. The site also had a file named 'A Guide to Developing a Sustainable Food Purchasing Policy' provided by UBC Vista website which help guide us on coming up with appropriate recommendations for our stakeholders for alternative sugar purchasing practices for UBC (Sustainability of and Supply Management, 2010).

Communication with stakeholders

We first decided to contact our stakeholders to find out what ingredients would benefit from a triple bottom line assessment by generating suggestions on how we could improve UBC's current sustainability system. The primary method of contact was through email (Appendix B), in which we introduced our group, our purpose for the project and we requested for an interview. Victoria Wakefield replied with us a list of possible ingredients that she felt we could focus our project on. From the list of ingredients we decided to perform our triple bottom line assessment on sugar. We then developed a list of questions for our stakeholders (Appendix C), which were asked during separate interviews. Prior to printing the names and using the information

provided to us by our stakeholders, they were required to sign a consent form, however, due to the location constraint, an e-mail response to the letter will be necessary to replace their signature of approval. If disapproved, the information obtained will not be used for the report.

We were able to schedule an interview with Nancy Toogood (AMS Food service Representative) on 11 March 2011. The interview was very insightful in learning the AMS concerns with sugar such as using non certified Organic white sugar and the trend towards the increase market price for sugar in recent years. In both interviews, we learned that AMS and UBC put tremendous effort in trying to source their ingredients locally and uses certified Fair trade products which suggest their willingness to improve their overall food sustainability system.

A second set of interview was required to obtain feedback from our stakeholders. The purpose of their feedback was to improve our recommendation so that we can design it to fit their current situation better. For example, UBC food service showed interested in decreasing sugar consumption in their products.

Alternate Data collection

We required data related to sugar pricing, purchasing information and other budget related data from both AMS and UBC food services. For the data related to UBC we were able to obtain from Nancy's assistant, Maria Domingo through email. As for AMS, Victoria referred us to the purchasing supervisor, Nick Gregory, and this was also through email. Both information are considered confidential and therefore certain numerical data will not be included in the Appendix.

Suppliers that carried Fair trade sugar were found through web based research (Appendix D) and we were able to contact them to obtain data (i.e. price and quantity) on their products.

Web Based Research

A large portion of our findings regarding the environmental, social and economic implications of the sugar industry was through various publication on websites and literature reviews which was found from using key words related to either environmental, social and economic implications of sugar (Appendix E). We also were each assigned a topic to research on for the triple bottom line assessment (Appendix F).

Web based Research for environmental, social and economic impacts of the sugar industry.

Environmental Impact

In order to find out distribution of processed sugar products, we first need to locate sugar refinery and processing factories in Canada. Growing up in Vancouver, B.C., we are all exposed to the strong presence of Rogers Sugar, which produces sugar packs that we see in the coffee shops. Using the key word “Rogers Sugar”, we were able to access to its company website (Rogers sugar. n.d.) The website provides many information including the number of refineries, description of work in refineries and product line ups. Another sugar production company is Redpath Sugar (<http://www.redpathsugars.com/>) based in Toronto, Ontario. Their product line includes organic counterpart for granulated white sugar, brown sugar and icing. We also accessed to Canadian Sugar Institute website (<http://www.sugar.ca>) through key word “Sugar in Canada” on Google search engine. This website has extensive coverage on economic statistics and histories of sugar production and use. Official websites such as World Wide Fund for Nature (World Wide Fund for Nature, 2005) and The World of Food Science by International Union of Food Science & Technology and Institute of Food Technologies (<http://www.worldfoodscience.org>). To estimate food miles and carbon footprint resulted from transportation, we use food mile calculator from Falls Brooke Centre (Fallbrook Center, n.d.) and Hamburg Sud (Hamburg Sud Liner Service, n.d.).

Social Impacts

From the purchasing information provided by the UBC Food system and AMS Food Society, I learned that Rogers Sugar was the main supplier of refined sugar. This suggests my next area of research on social implications of sugar consumption should be based on raw sugar farmers in countries that Rogers sugar obtain their sugar from. From the Rogers Sugar Inc. website (Rogers sugar, n.d.), it states that approximately 90% of their raw sugar are cane sugar imported from tropical region such as South and Central America, Australia and the Caribbean. The other 10% are obtained from raw beet sugar produced locally in Canada. Therefore, I decided to focus my search on farmers on those specific countries. From Statistic Canada I was able to obtain a more detail raw sugar import data for the year 2008 (Appendix G).

Moreover, I wanted to look at the issue which our stakeholder Victoria Wakefield suggests which is about fair trade sugar and how that ties in with improving the welfare of raw sugar farmers. Firstly, more research was done on the Internet to help understand what constitutes as fair trade sugar (Fairtrade International, 2004).

This allows me to decide on whether unethical practices exist in the production of raw sugar from countries that Roger's is importing from. I used terms/phrases such as, 'working conditions of sugar cane/beet farmers'. 'Fair trade issues for raw sugar farmers', to search on Google scholars on the livelihood of farmers.

Economic Impacts

According to some purchase record provided by AMS and UBC Food Service, we have organized the data into four pie graphs to analysis the percentage expenditure on different type of sugar products and different brand of sugar that AMS and UBC Food Service purchases (Appendix H) . The pie graph will be able to tell which type of sugar that AMS and UBC Food Service each spent the most money on and which brand of sugar is most dominate for each of them. Then, we contact various sugar distributors for their price on the products that AMS and UBC Food Service spent the most money on and use them as comparison to see whether the expenditure of AMS and UBC Food Service was efficient (Appendix I) (Appendix J).

4.1 Ecologic Sustainability

4.1.1 Agricultural practices

Granulated sugar is derived from two crops: sugarcane and sugar beets. These two widely different plants require very different agricultural practices and very different climates for growth; as a result the ecologic impacts of their production vary.

Sugar beet is cultivar of the common beet eaten as a vegetable that has been bred for high sucrose content in the root. It is temperate plant species that is grown as an annual in sugar beet production. Its production in Canada is centred near the Roger's Sugar processing plant in Alberta where farmers are contracted to grow a set acreage. Sugar beet is grown in a rotation in order to avoid disease pressures, occupying the same land just once every four years typically. Planted in the early spring, the low-growing crop requires significant weed management through cultivation of herbicide use until canopy-cover occurs in mid-summer. Beets are susceptible to several pests and need spraying if outbreaks occur (Chaudhary 2009).

Fertilisation, primarily of nitrogen is necessary to realise full yield potentials and relatively high levels of application are typically used. Irrigation is another requirement for sugar beet production in Alberta, although other temperate regions, such as Britain, with lower evapotranspiration and more precipitation do not require this input. Due

to their annual nature, field cultivation occurs every year in the spring; harvesting requires significant soil disturbance in removing the root crop, and the fields are generally left bare throughout the winter. Cultivation of the fields, fertilisation and spraying, and harvesting are all highly mechanised in Canada and utilise large tractors and implements (Chaudhary 2009; Burnett *et al.* 2003).

Sugar beets are grown organically in some areas of the European Union, and sparingly in the United States; there is no commercial production of organic sugar beets in Canada. Growing sugar beets organically poses challenges to the farmer, particularly regarding weed suppression. Well-timed cultivation and good rotation can allow for a healthy, productive yield under organic methods (Burnett *et al.* 2003).

Sugarcane is a tropical perennial grass native to Papua New Guinea. As a plant capable of C4 photosynthesis it has growth potential far exceeding most crops and can grow to heights of 4 or 5 metres over a 12-18 month period. This time period is the typical length a crop is allowed to grow before harvest. The perennial nature of the crop allows fields to remain untilled for 4 or 5 years, after which a new planting, or ratoon, of sugarcane must begin. Sugarcane is a relatively slow grower initially and will typically take 3-4 months until it reaches complete canopy cover and shades out weeds. Once this level is reached, management for weeds becomes unnecessary. Until this stage of growth regular cultivation or herbicide application is required to ensure the crop doesn't face competition (*Sugarcane* n.d.; Burnett *et al.* 2003).

Nitrogen fertilisation is, as with sugar beets, necessary for optimal yields of sugarcane, and is often accompanied by phosphorus and potassium fertilisation. Sugarcane is responsive to high applications of fertiliser and so is often subjected to more fertiliser than it can efficiently convert into biomass, particularly where fertiliser is subsidised (*Sugarcane* n.d.; Augustburger *et al.* 2000).

Sugarcane is particularly susceptible to a number of fungal diseases that tend to occur in the lower, poorly aerated, foliage of more mature sugarcane stands. These leaves are removed manually where labour is available, otherwise fungicides are relied on to combat disease. The perennial nature of the crop increases the risk of fungal and other disease populations accumulating in the fields.

Sugarcane is, nearly without exception, dependent of irrigation. Many of the regions it is grown are simply too dry to facilitate production without irrigation, and those with adequate annual precipitation rarely receive this rain in

appropriate proportions throughout the season. Irrigation is most commonly done through the flooding of furrows dug between rows. Before canopy cover a significant amount of this water can be lost to evaporation, and even later in the growth stages much of the moisture can be lost through leaching. This relatively inefficient method is preferred because overhead irrigation increases disease risk. Sugarcane is therefore considered a high irrigation use crop; this is of particular concern when grown in arid subtropical regions (Gujja *et al.* 2009; Clay 2009).

Harvesting of sugarcane is done either by hand or by mechanisation. Where labour is cheap, the large plantations that sugar is typically produced on are burnt to remove excess foliage, leaving just the cane behind. This practice results in huge carbon emissions and a consequential loss of potential soil organic matter. It is done to ease the process of hand harvesting by reduce stalk weight. This practice is prevalent in Brazil, although it is in the process of being outlawed. Where labour is scarce, mechanisation is the favoured method of harvest, and large harvesters are capable of harvesting fields quickly.

Organic sugarcane is usually grown in quite different circumstances than its conventional counterpart. Growers are often smallholders with sugarcane rarely exceeding 2 hectares. Once cut, or after initial planting, another crop is often grown between the wider rows to increase farm income and reduce weeds. The result of wider spacing is greater irrigation demand and reduced disease pressure; necessary measures for low-input farmers. Fertility is maintained through compost and animal manure applications, although these rarely provide sufficient nutrients to realise maximum yields. Smallholders are more likely to integrate animals and other crops into their farming system, increases resiliency to market pressures, disease, and soil nutrient imbalances (Gujja *et al.* 2009; Clay 2009; Augustburger *et al.* 2000).

4.1.2 Processing, carbon footprint

Findings

Initial processing

About 90% of Canada's raw cane sugar is imported from tropical regions such as South America, Central America and Australia. Sugarcane is partially refined at mills near sugarcane fields before coming to Canada. Refined sugar produced from sugar beets are domestically grown and refined in Alberta. The initial processing requires

cleaning and grinding of raw sugarcane. They move on a conveyor belt waiting to be juiced by rollers, which then separates crushed pulp and juice. The initial process creates a large amount of waste pulp called bagasse. Bagasse is produced in the mill house in a quantity of about 30% of the crushed cane. It contains 50% moisture. This waste material is often used as a primary fuel source for sugar mills. It produces sufficient heat energy to supply all the need of a typical sugar mill. Sugar juice are then mixed with carbon dioxide and the milk of a lime for clarifying purpose to remove impurities. Evaporation ensues to enhance crystallization of raw liquid sugar. The processing of sugar beets is very similar to sugarcane. However, since sugar beets are produced domestically, the refinery process is continuous from raw beets to refined sugar. The waste pulp and residue from sugar beets are used to produce animal feed or further processed to fibre.

Transportation - Cargo Ships

Bulk raw sugar is transported to domestic refinery through ocean-going cargo vessels that carry from 20 - 40,000 tonnes at a time. Based in year 2008, the total import from South America is approximately 831,213 tonnes (*Statistics Canada International Trade Division*). It means the cargo ships have travelled roughly 27 times from South America to Canada carrying bulk raw sugar in 2008. Using a carbon footprint calculator provided by Hamburg Sud (Hamburg Sud Liner Service, n.d.), we were able to estimate the total carbon footprint and the distance travelled each shipment. We set our loading location at Rio de Janeiro, Brazil as Brazil sugar exports contribute to majority of Canadian sugar imports. We set the discharge location at Seattle, United States of America because the calculator does not have port of Vancouver in their option. Seattle is the next best alternative as it is only about 200km south of Vancouver, B.C.. The total travel distance is 20,218km from Rio de Janeiro to Seattle. The total carbon dioxide emission is 5,708,828kg based on the cargo load of 30,000 tonnes each shipment. As they are total of 27 shipment, we estimate total of 154,138,356kg of CO₂ emission in 2008. This is the rough estimate of carbon foot print for sugarcane import from South America alone. In other words, each ton of raw bulk sugar produces 190.24kg of carbon dioxide. Canada also imported 423,373 and 26,931 tonnes of raw bulk sugar from Central America and Eastern Hemisphere (Australia) respectively. It is safe to assume that the total carbon footprint for sugar import is well above 200,000,000kg of CO₂ emission per year.

Secondary Processing:

Once raw bulk sugar arrives in the sugary refinery, they are softened and cleaned to remove a layer of residue surrounding the crystals through process of affination. The raw sugar is mixed with warm and concentrated sugar syrup and then centrifuged to separate crystals. This process removes a lot of impurities. Tiny particles of natural chalk are added in the next step to cling to small residues particles for easier filtration. Another filtration is in place to collect pure, liquid sugar. The boiling step heats the sugar syrup and initiate crystal formation by adding fine sugar dusts. A centrifuge system is in place to separate liquid from crystals, which can then be packaged.

Domestic Distribution:

Throughout Canada, domestic distribution of refined sugar from sugarcane and sugar beets is estimated to be 1,197,795 tonnes in 2008 (Statistics Canada). Unfortunately, we are unable to acquire specific data on the total distanced travelled for sugar distribution. The maximum load of trailer trucks is up to 62.5 tonnes in Canada.(Canadians for Responsible and Safe Highway, CRASH, The Railway Association of Canada) We calculate that it would require at least 19165 shipment of trucks for annual distribution, assuming that each truck loads up to maximum.

Besides raw bulk sugar from sugarcane, Canada produces sugar domestically from sugar beets in Alberta. Sugar beets farms and refineries are located in Taber, Alberta. Total sugar beet production was 385,219 tonnes in 2008/2009 (Alberta Sugar Beet Growers, n.d.). Refined sugar beet production was estimated to be 56,463 tonnes. They are transported in piles from farms to the refinery for processing. Crystallized sugar after processing is transported from bulk storage silos to packaging station or used for liquid sugar production. If the packaged refined sugar is transported from Taber, Alberta to Vancouver, B.C., each shipment has food miles of 1236km and carbon dioxide emission of 20690.6kg, assuming that each truck loads up to maximum. (<http://www.fallsbrookcentre.ca/> food mile calculator). Each ton of sugar produces 331.0496 kg of carbon dioxide. The carbon emission by trailer truck transport is significantly larger than ship transport.

Discussion:

The two very different crops that are processed to produce sugar both have their own unique environmental challenges. Both crops, when grown conventionally require significant chemical inputs of fertiliser, pesticide, and herbicide; and when comparing Alberta grown sugar beets to most tropical sugarcane production, both require irrigation. The negative environmental effects of much higher irrigation use by sugarcane in regions of low water security is balanced by the potential for soil erosion caused by annual tilling in sugar beet production. A more prevalent adoption of organic methods in sugarcane productions may indicate that it is more adaptable to organic, low input practices.

Although the refining processes for both crops are similar, the extra initial stage of processing sugarcane must endure, and the harsh chemicals involved in this process, add to the environmental costs. However, the use of the bagasse as fuel for the refinery is an important energy conserving trait. The by-product of beet refining, beet pulp, becomes a useful animal feed, but still must be shipped elsewhere, entailing a carbon footprint. Despite the much greater distance that sugarcane from South America must travel, it appears to have a lower carbon footprint per kg than that of trucking beet sugar from Alberta because transport by sea is much more efficient than that over land.

Due to the unavailability of organic sugar derived from sugar beets grown in North America, and contrary to the assumption that greater distance equals greater ecologic impact, we conclude that the most ecologically sustainable option for sugar procurement is organic cane sugar. In an ideal situation, we would have organic sugar beets growing in the Fraser Valley, or somewhere closer than Alberta, but given the reality of the situation, sugar beets - with their high input needs, larger land base requirement, annual tillage, and greater transport associated carbon – are a less sustainable option.

4.2 Social Sustainability

4.2.1 Social welfare

Findings

The Canadian supply of domestic raw sugar are mainly from Canadian beet growers, which only meets 10% of the countries demands for raw sugar. The remaining 90% is from raw cane sugar imported in bulk mainly from tropical regions. Therefore, a majority of the information regarding social implications of sugar farmers will be focused on, South American, Central American and Caribbean sugar cane farmers. Sugar

cane farmers in the developing world are forced to work in social unjust conditions, such as low wages and harsh working environment, so that sugar mill owners could provide low cost sugar to compete in the global sugar market. In many cases, the prices paid for sugar farmers in some developing countries has declined to a point which barely covers the cost of production.

In Brazil, a major source of raw sugar for Canada, there are approximately 1 million workers employed as sugar cane farmers. In 2007, sugar cane employment accounts for 72.9% of all formal jobs. The minimum wage in Brazil is set very low to begin with so even though the average wages paid to sugar cane workers are above minimum wage, the majority of them are still living in poverty (Macedo, I.C., 2007). Low wage issues are more prominent in North-Northeast region of Brazil, where sugar cane workers earn on average 58.7% less wages than workers from the South(Macedo, I.C., 2007). Sugar cane cutters face various hazardous risk which is not reflected in their low paying jobs because it is considered low-paid work (Aksoy and Hoekman 2010). The workers that are at highest risk for health hazards are those that have to cut sugar cane either manually or mechanically. A study was conducted on workers on a sugar cane mill located Northwest of Sao Paulo, Brazil. The sample of this study is on 39 out of 1700 manual sugar cane cutters and 16 out of 90 mechanical cutters. The main goal of the study was to ‘analyze the work and of life situation that can offer risks to the workers’ health...’ (Rocha et al. 2010). During the study participants were interviewed about their working and health conditions using open-ended question. Manual labor workers worked less hours that mechanical labor workers. However, manual workers reported more health problems, mainly respiratory problems from exposure to soil dust and upper limb injuries resulting from their repetitive cutting movement. On the other hand, mechanical workers are scheduled to work 10 hours in a day for 11 consecutive days(Rocha et al. 2010). This mentally strenuous task leads to machine accidents which was reported by 33.3% of the workers interviews and 31.2% reported being mentally fatigued by their work (Rocha et al. 2010).

Fair-trade International is an organization that helps ‘promote trade justice internationally’ through setting standards that must be met for all product that bares the certified Fair trade logo (Fairtrade International,, 2004). There are two sets of standards, one that applies to all Fair trade products and the other, which is designed specifically for a category of products. Under sugar production, they separate their principles

into two categories, one for trade standards (pricing) and the other for producer standards (Fairtrade International, 2004).

Labor condition requirements for small producers must meet the International Labor Organization (ILO) Standards. The ILO is an act that promotes 'decent safe and healthy working condition and environment' for workers'(International Labor Office, 2009.) . There are also separate requirements for hired labors, which employers must adhere to. For example, it is important for owners to share same values and goals as the fairtrade organization, fairtrade must be implemented at every processing level and free from child and forced labor to name a few (International Labor Office, 2009.).

Trade standards for certified Fair trade sugar helps with protecting sugar cane farmers from volatile sugar prices. Firstly, companies that are trading Fair trade products must pay producers the 'Fairtrade Minimum Price' which is the amount of revenue that producers can continue sustainable production (Fairtrade International, 2004). On top of the Fairtrade Minimum Price, the 'Fairtrade Premium' must be added on, this is to help producers invest in development. Lastly, producers have the option to request their buyers to pay them in advance (Fairtrade International, 2004).

There have been many positive feedbacks from sugar growing communities that have benefited from the Fairtrade organization. In Guarambare, Paraguay, sugarcane farmers produce approximately 10,000 tons of organic sugar cane per year (Green America, n.d.). Since attaining the Fair Trade certification in 2004, the profits were spent on technical assistance available for farmers, credit programs and health care for farmers at a reduced cost (Green America, n.d.).

In Canada, sugar beet farmers are very well represented by several organizations such as Nation Farmer Union (NFU) and Alberta sugar beet farmers organizations. Such organizations represents the voices and opinions of their member sugar beet farmers by helping them address political, social and economical issues that sugar beets farmers may face. On the NFU website they emphasize their goals is to meet their sustainable agricultural policy which they define as 'a system of food production, processing, and distribution that is, in all stages, economically viable, socially just, and ecologically sound.' In terms of social implications, they help fight for farmers rights such as increasing government subsidy for beet farmers and giving property rights to the farmers or local citizens (National Farmers Union, n.d.)

Discussion

Through online resources it is evident that sugar cane farmers from developing countries are facing more hardships than Canadian beet farmers. In many cases, farmers from developing countries that earn above minimum wage still can't sustain a living because minimum wages are set so low. Moreover, the communities of economies dominated by the raw sugarcane industry are not benefiting from it because too little profits are generated which could be redirected to help improve the infrastructure of the community it belongs to.

In order to discourage such poor social conditions for raw sugar farmers it is evident that the voices of farmers must be represented by organizations. In Canada, sugar beet farmers are very well represented because of organizations/unions that fight for rights to for sugar beet farmers. One of the most important issues is the decline of global market prices of sugar cane/beet leading to low profit margins for unrepresented farmers in the developing world. Since Canada relies most of its raw sugar from importing from foreign countries, therefore, it must rely on world organizations such as Fair trade sugar which to ensure sugar cane farmers are getting their deserved rights in terms of working conditions and wages.

4.2.2 Social Sustainability - Health Implications

Findings

Obesity is a disease that is rapidly growing in our societies, and is becoming a significant problem worldwide due to its negative health implications. It is the result from a prolonged positive imbalance between energy intake and energy expenditure resulting in the storage of fat (Kenny, 2011). The health problems linked to obesity include but aren't limited to stroke, cardiovascular disease, diabetes mellitus and an increased risk of developing cancer (Hurt et al., 2010). Health care costs owing to obesity alone in the US have been estimated at close to US\$150 billion (Volkow et al., 2011). The concept of food addiction is now becoming one of the accepted potential causes of obesity.

Food addiction is a chronic, relapsing problem caused by various factors that encourage craving food in order to obtain a state of heightened pleasure, energy or excitement (Von Deneen and Liu, 2011). There have been clinical accounts in which self-identified food addicts use food to self-medicate; which means they

often eat in order to escape a negative mood state (Avena, 2010). Other clinical studies have shown that food craving activates areas of the brain similar to those indicated in drug craving (Avena, 2010).

Discussion

Is brown sugar healthier than white sugar? Most brown sugar bought in stores is actually refined sugar with the molasses added back in (Absolute Astronomy, 2011). Brown sugar has a slightly fewer calories by weight than white sugar does, due to the presence of water: one hundred grams of brown sugar contains 373 calories, compared to 396 calories in white sugar (Absolute Astronomy, 2011). This being said, brown sugar packs more densely than white sugar due to the smaller crystal size and may have more calories when measured by volume for example, one tablespoon of brown sugar has 48 calories against 45 calories for white sugar (Absolute Astronomy, 2011). The molasses in brown sugar does contain some minerals such as calcium, potassium, iron and magnesium, but they are present in such minuscule amounts there is not much of a health benefit to using brown sugar (Absolute Astronomy, 2011). The only real differences between the brown sugar and white sugar are taste and the effects on baked goods. Is any type of sugar healthy? No, sugar doesn't contain much nutritional value, and usually acts to displace other nutritious food a person should be eating. Organic sugar uses fewer chemicals in the refining process but the nutritional content is still the same.

Our recommendation is to minimize the amount of sugar used in food products and consumed in our diets. When possible try using natural sugar alternatives such as stevia, maple syrup and honey.

4.3 Economic Sustainability

Findings

Base on the purchasing record, we found that AMS spent the most on Granulated Fine Sugar, which contain 61% of their total expenditure (Appendix H). The UBC Food Service spent the most on Golden YEL Sugar which contain 30% of their total expenditure (Appendix G). In term of Brand Expenditure, according to Appendix H, both stakeholders spent the most amount on Rogers Sugar (AMS spent 61% of their total expenditure on Rogers Sugar and UBC Food Service spent 91% of their total expenditure on Rogers Sugar). In term of our price comparison, we found a good alternative, which is the Horizon Sugar. According to Appendix J, the granulated White Sugar for UBC on average was \$29.6 for 20 kg, while Horizon is willing to

offer Unrefined Cane Sugar for \$50 every 20 kg. This deal is considered to be very good when comparing with the price which was offered by International Sugar Inc in Appendix I. Their organic sugar is \$65 per 10 kg of sugar + a minimum \$5 of shipping, which is about 20% more expensive than what's being offered in Horizon. Also, according to the world export record, unrefined Cane Sugar are usually two to three times more expensive than the Granulated Fine Sugar. Therefore, the price offered by Horizon Sugar was really considered to be on the less expensive side.

Discussion

It is rather unfortunate that there aren't too much sugar brands to choose from in Canada. Rogers and Lantic Sugar has formed together to create a large monopoly in BC (Canadian Sugar Institute, n.d.). The Redpath Sugar is probably the next biggest brand, which is located in Quebec, but they don't sell sugar in bulk. They are not willing to ship their sugar to far distance (Personal communication, 2011). Also, with recent economical analysis, the sugar price was expected to increase for around 30% from 2010 to 2011 (Sadler, 2010). Therefore, a well managed economic plan is mandatory when the price changing takes place. In long term, it might not be a good idea for both AMS and UBC Food Service to stick with the Rogers Sugar. The main reason if there is an expected increase in sugar price, Rogers Sugar might abuse their market power and raise their price to an inefficient amount. Therefore, it is always a good idea for both AMS and UBC Food Service to search for smaller sugar distributor for better deal and avoid the monopolistic power from Rogers Sugar. Furthermore, according to Canadian Sugar Institute (n.d.), Canada has a much lower refined sugar price than country like US due to better production industry. However, their cane sugar price are high, because Canada's climate is impossible to grow cane sugar and majority of the cane sugar product are imported from tropical region including South and Central America, Australia, and Caribbean (Canadian Sugar Institute, n.d.). Therefore, if UBC Food Service and AMS are considering for organic sugar, shipping some sugar from outside of the country may also be a valid option.

5.0 Stakeholder recommendations

The implementation of Fair trade organic sugar into the AMS/UBC Food system should happen gradually. A timeline could not be constructed since many negotiations between stakeholders and wholesalers

must take place to calculate the lowest possible cost for Organic/Fairtrade certified sugar were to be purchased. At the same time, stakeholders would need to discuss with chefs/bakers on how to incorporate substitutes of white fine granulated sugar into new or existing recipes. A strong emphasis should be put on marketing these products as fair trade organic in order to justify the potential increase in price to the customers. Along with this, employees selling these items should know what fair trade means and be able to tell the customer about it if they ask.

we have provided recommendations that we think would be most suitable based on how AMS and UBC Foodservice is organized. However, we suggest stakeholders to read over both recommendations as they might take interest in either one.

5.1 AMS

Local distributor on alternative sugar:

Horizon is a distributor located in Burnaby. (<http://www.horizondistributors.com>) Currently, they carry Camino golden cane sugar from La Siembra Co-operative. Golden cane sugar is certified organic, fair trade certified and certified kosher. They come from Paraguay and Cuba. Fair trade certified whole brown sugar is also available. Having a local distributor also makes buying fair-trade sugar more convenient. Using granulated white sugar as an example, average price for 20kg Rogers sugar is \$29.6. Horizon's Camino sugar has average price of \$50 per 20kg. (see Appendix J). It is \$20.4 increase for each 20kg bag of sugar.

We understand that cost is a major factor when purchasing food ingredients. It could be unrealistic to switch all sugar to organic/fair trade sugar as the cost could be a lot higher. However, we think it is worth a try to introduce fair-trade sugar in one of the outlet. We use Blue Chip cookie as our example. In one cookie, the cost for sugar is about 5.92 cents. With Horizon's fair trade product, it is 10.8 cents per cookie. The increase is approximately 4 cents per cookie. (see appendix k) Overall, the retail price for each cookie could increase by 10 or 20 cents. The use fair trade sugar should be heavily marketed and promoted to inform consumers the reason for price increase and to raise public awareness on buying fair trade products.

Incorporate fair trade products in food outlets:

Ethical bean coffee (<http://www.ethicalbean.com>) currently offers fair trade organic doughnuts that are entirely made in fair trade ingredients. We believe fair trade doughnuts would be a nice addition to food outlets such as Blue Chip Cookie and Bernoulli's Bagels. The combination of fair trade doughnuts with existing fair trade coffee offered by food outlets not only raises the awareness of fair trade products, but also pushes AMS to become a more sustainable food and service provider at UBC.

5.2 UBC Food Service

Acknowledging the vast number of negative health implications due to the over consumption of sugar, less sugar should be used in products and when possible natural sugar alternatives should be substituted.

UBC foodservice is always targeted towards the campus community, which is mainly made up of students. Many students that live on campus rely campus dining halls for the majority of their meals during their stay at UBC, therefore, it is important that the food provided are of good quality, low price and nutritious.

The price of the food must always be reasonably priced because the majority of students have limited funds that they can spend on food. Therefore, the biggest challenge with switching over to Fairtrade sugar would be the rise in production cost for all food products. A more appropriate method would be to substitute white granulated sugar with fruit based sugar ingredients, for example, using bananas to replace white sugar in a muffin. To see the benefits of this Figure 1. shows a comparison of the nutritional value between three different muffins offered in Tim Hortons.

Figure 1. Nutritional information of Muffins offered in Tim Hortons

(Tim Hortons Canada, n.d.)

	SERVING SIZE	CALORIES (kcal/s)	TOTAL FAT (g)	SATURATED FAT (g)	TRANS FAT (g)	CHOLESTEROL (mg)	SODIUM (mg)	CARBOHYDRATE (g)	DIETARY FIBRE (g)	SUGAR (g)	PROTEIN (g)	VITAMIN A	VITAMIN C	CALCIUM	IRON	% Daily Value	REMOVE ITEM
Chocolate Chip Muffin (1)	115 g	410	15	5	0.3	35	430	62	2	37	5	0	0	4	10		
Fruit Explosion Muffin (1)	122 g	360	11	2	0.2	40	580	56	2	27	5	0	4	4	10		
Strawberry Sensation Muffin (1)	122 g	360	11	2	0.2	35	560	58	2	28	5	0	18	4	10		
Meal Total >		1130	37	9	0.7	110	1570	176	6	92	15	0	22	12	30		

According to Figure 1. One chocolate chip muffin has 11-10 g of more sugar than the fruit explosion muffin and the strawberry sensation muffin. For a student that has a muffin for breakfast or snack each day would be consuming approx. 70 g less sugar if they were to choose fruit based ones.

We suggest that what UBC food services could do, is to look into a variety of fruit based pastries and to offer them on campus on all the food outlets. Also, we suggest to not have the low sugar pastry items primarily named as 'low-sugar' since some students may be reluctant to try it assuming that it is less tasty than non low-sugar products. The most important step would be to find the right recipe that substitutes sugar with low costing ingredients (e.g. local BC apples) while able to produce a high quality and tasty product.

By simply decreasing the amount of sugar we buy, we could minimize the economical affect that spending more on fair trade organic sugar would have on our budget. This would also promote eating less sugar, which could potentially help decrease the obesity epidemic.

4.2 Project Evaluation

By focusing our project on conducting a triple bottom line assessment on sugar we were able to obtain alot of information through the Internet on the environmental, social and economical impacts of the sugar industry. We were able to obtain information specifically from Rogers sugar (now owned by Lantic sugar) which was the main supplier for both AMS and UBC food services because it is conveniently located in Vancouver. Our stakeholders were also very resourceful and were able to provide us with the numerical data we needed on sugar purchasing and consumption for both UBC and AMS. Also,since the purpose of the project is for a community that we are also apart of, we feel that we can have a greater understanding to what issues needs to be addressed. This project relates to us in a more personal level since our finding and recommendations could ultimately impact us. Although UBC is currently purchasing local Rogers sugar that does not promote fairtraide practice, however it purchases local sugar beets and has a local refinery which means that there lesser carbon footprint generated. Also, there has been great movements within our community (UBC and Vancouver) for Fair trade and organic practices. Therefore, this has lead several producers and distributors in Vancouver that carries certified organic and fair-trade sugar being sold in bulk.

We were able to contact several distributors and obtain their prices to conduct further analysis that was used in our recommendations.

A challenge we had is that we are all apart of the Land and Food system faculty and alot of what we learn emphasizes on practices that promotes environmental sustainability. However, not everyone in the UBC community shares the same value and many of them would consider economical issues such as the rise on food prices to be more important. Therefore, our analysis could be less bias if we had students from other faculties that could collaborate and bring in their perspective.

Finding a recommendation to improve the current situation of purchasing sugar from rogers and the amount of white granulated sugar consumer was another challenge. Our findings tells us that fair trade sugar costs 40-60% more than the white granulated sugar purchased from Rogers. This becomes an economic barrier because our students, which are the main consumers of all the retail outlets for UBC and AMS, will be unable to bare the extra cost associated with the increase for all products containing fair trade sugar. One way we tried to overcome this challenge is by suggesting only switching a small percentge of Rogers white granulated sugar to Coco Caminos certified orgranic cane sugar. We find this to be more realistic and economically feasible.

Lastly, we find the project would have benefited if we had more time to do more research on the recommendation portion of the project. Many suppliers that we requested information for were not able to give us immediate pricing for their certified Organic and/or Fairtrade sugar. We only had 3 the contacts of three supplier in Vancouver that could be potential suppliers for UBC/AMS.

Stakeholder feedback review:

Nancy Toogood (AMS)	Maria D (UBC Food System)
She thought what needed was a behavioral change, for example, when they first sold fair trade coffee, not a lot of people knew about it. However, UBC created more awareness on social responsibility and importance for our community to become sustainable.	She had two concerns; firstly, with the price increase of switching to fair trade organic sugar; secondly, with the quality (taste and appearance) of the final food product if they were to substitute white granulated sugar with alternative sugar ingredients (i.e. maple

<p>Therefore, this leads to increase demand for fair trade coffee which lead to a price decrease as well.</p>	<p>syrup).</p> <p>She was suggested us to look at fair trade refinery that is closer to our community since the brand we suggested, Coco Camino, is from Ontario, This means that the switch to Coco Camino from Rogers would result in a higher carbon footprint.</p> <p>She was very interested in the suggestion of introducing low-sugar products as a way to decrease sugar consumption.</p>
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For future LFS 450 project

- We suggest that more time should be allocated towards creating a more in depth and precise recommendation. Instead of having our project for both UBC and AMS, future scenarios should possibly focus on one so that more specific recommendation could be made. This is because UBC and AMS food service are run differently, and offer different products and have different supplier for certain ingredients. We feel that by having only one stake holder, we could have dedicated more time to work closely with them, then more time could be focused on recommendations the stakeholder. Overall, the recommendation we would be more in depth and precise.

7.0 Conclusion

We were able to investigate the origins and life cycle associated with sugar production through a triple bottom line analysis of ecologic, social, and economic realms of sugar. This allowed us to compile a series of recommendations for the AMSFBD and UBCFS. We concluded that our stakeholders, given the associated social and ecologic costs of our current sugar procurement, should make a concerted effort to integrate organic and fair trade sugar into their procurement strategy. We recognize that this may need to occur in stages, and recommend that both services promote the use of this product in order to inform consumers. We feel that the

economic cost of transitioning is small enough to be accounted for by other means and that it greatly outweighs the benefits to the environment and those involved in sugar production. We also recommend that our stakeholders remain aware of changes in the industry should more sustainable options become available.

We are confident in our recommendations and hope that any further research into this subject will investigate, with greater specificity, more tangible options for our stakeholders.

Acknowledgement

We would like to thank our stakeholders from AMS food and beverage department and UBC Food Services. They have provided tremendous information and insight

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Appendices

Appendix A

Principles	Definitions
Leadership	Taking responsibility and leadership in sustainable purchasing
Social Inclusivity	Always be mindful of people from diverse culture. Source products that promotes better workplace and improves the communities of the people who have part in producing it.
Environmental Stewardship	Support the use of products and services that conserve natural resources and reduce carbon emissions. Choose products that are renewable, deconstructable, and/or use cradle-to-cradle design.

Accountability	Practice fairness and transparency, factor in total cost of ownership when assessing a product or service and support the use of third-party, independent standards for materials and ethical conduct.
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(Sustainability office and Supply Management, 2010.)

Appendix B

Email template to stakeholders

Dear _____,

We are the LFS 450 group focusing on the Triple Bottom Line Assessment of a product group within the UBC Food System. We are in the process of determining what product group we should focus our research on and wanted to ask you a quick question.

Currently, the categories to consider include: seafood, fruits, vegetables, meat, meat alternatives, non-fluid dairy, plus several other smaller categories. From your understanding of volumes used, implicate costs, and perhaps ecological impacts, what product group(s), listed or otherwise, do you feel would benefit most from our research?

Also, we would like to schedule meeting with you to discuss these or other options in the near future. What is the best method of communication for you? Until then, do you have any initial thoughts to our question?

Thank you for your time!

Kimmy Kwok, et al.

Appendix C

Interview Questions

- 1) What is the amount of budget you can spend on sugar? (or anything that is related to food budget)
- 2) Where do you purchase sugar from, the prices and purchasing amounts.
- 3) Do they have any partnership contract or discount with any company?
- 4) What are the sugar mainly used for?
- 5) What is the current policy for fair-trade sugar procurement in AMS/UBC food service?
- 6) What are student's feedback for fair trade products at AMS/UBC?

Appendix D

Products of interest	Price	Extra info
Unrefined certified organic cane sugar (Brand: coco camino)	63CAD/ 25 kg	Free delivery for orders more than 200CAD
Fairtrade certified organic cane sugar	70CAD/25kg	Includes delivery price Currently all out of organic sugar

Appendix E

Examples of key terms used for web based search

- Rogers sugar, Health impacts of sugar cane farmers, Brazil sugar farmers, Fair trade sugar , Wage for sugar cutters in Brazil

Appendix F

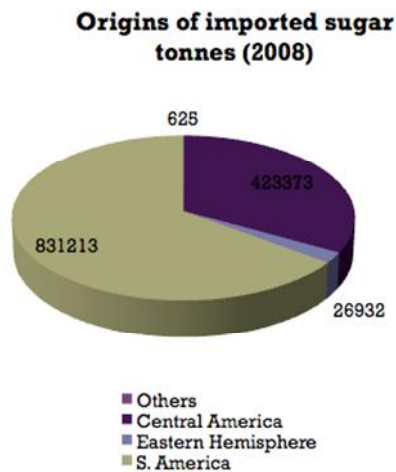
Jerry Lin - Environment, Processing, Distribution

Foster Richardson – Environmental Impacts

Kimmy Kwok - Social welfare impacts - sugar cane farmers/producers/cutters, communities of sugar farmers, sugar beet farmers, fairtrade impacts

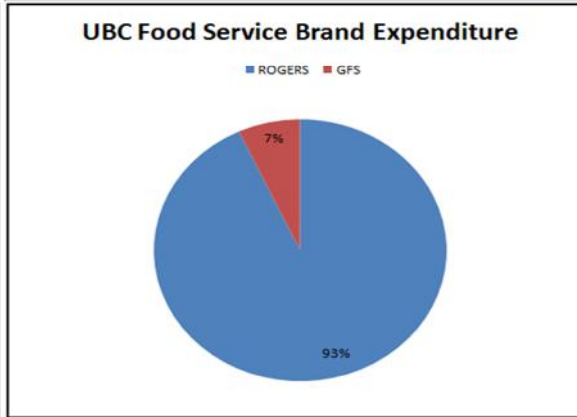
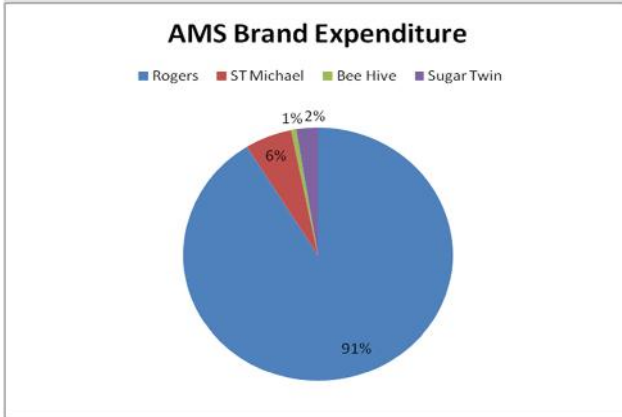
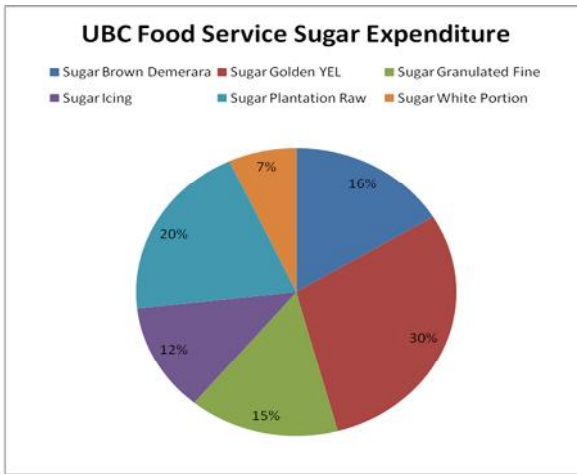
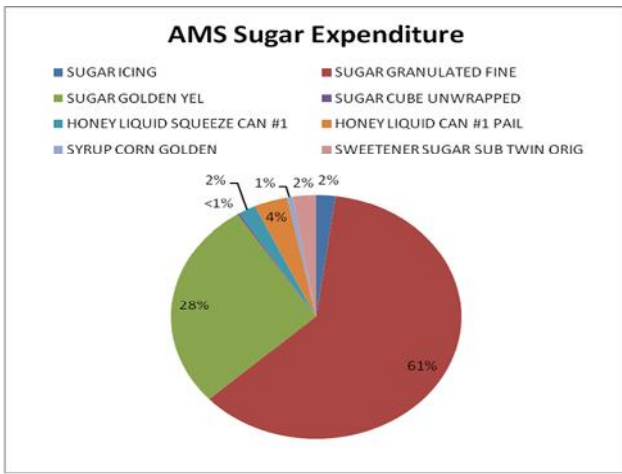
Melanie Thompson – Health Impacts

Appendix G



(Canadian Sugar Cane Industry, n.d..)

Appendix H



Appendix I

	Sugar Granulated Fine	Sugar Golden YEL	Organic Sugar
UBC Food Service	\$15	\$20	N/A
AMS	\$16	\$18	N/A
International Sugar Inc	\$15+5	\$20+5	\$65+5

Appendix J

Company	Size	Average Price	Location
Rogers	20kg	29.6	Vancouver
Horizon	20kg	50	Burnaby

Appendix K

	Rogers	Horizon
Sugar cost per cookie	5.92 cents	10.8 cents
- Increase approx of 4 cent per cookie		