UBC Social Ecological Economic Development Studies (SEEDS) Student Report

An Investigation into 30% Recycled Wood Fiber Paper and Sugar Cane Paper

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University of British Columbia

APSC 262

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Submitted To: Dr. Naoko Ellis

ABSTRACT

Paper is one of unavoidable resources being used in university. In the University of British Columbia, roughly about 82.7 millions of paper are being used yearly. To make paper usage more efficient while campus community keeps its sustainability, Paula Goldspink, who is from the UBC's Supply Management, aims to find an alternative for wood fibre paper UBC currently uses. Mike Nilan, from the TreeZero Company, made a suggestion to Paula of having UBC replace the 30% recycled wood fibre paper they currently purchase from Grand & Toy (G&T) with paper made of sugar cane. The product of the TreeZero Company, the TreeFrog paper is manufactured and produced in Columbia without using any traces of wood chips. By using the triple bottom line analysis (TBL), this report provides a thorough investigation into the social, economic and environmental impacts of using sugar cane paper on a local and national scale.The raw materials used to make both the wood fibre paper and the sugar cane paper was being investigated. The analysis into the environmental impacts covers the ecological footprint of each type of paper with the amount of pollutants produced and released annually. Economical impacts include the relative cost of sugar cane paper to wood fibre paper which was calculated based on raw materials, labour, pulp and bleach used for making the papers including an investigation into the cost of importing sugar cane was also being considered alongside with revenue and loss of the industry. Social benefits, such as more available jobs, the amount of salary for farmers, and profit of local sugar cane industry were also being discovered throughout the analysis.

In general, the proposal of switching from using wood fibre paper to sugar cane paper was found to have more advantages than disadvantages. The manufacturing process was discovered to be the same for both types of paper and the price of sugar cane is much cheaper than wood chips in near future. Sugar cane paper uses no trees at all and produces fewer pollutants while deforestation is needed for wood fibre paper. As a final point, sugar cane paper will aid in the improvement of the sugar cane industry and the income of the farmers in other countries. Sustainability awareness will be widely promoted and UBC's image as a leader in sustainability will be well-known in Canada and to the world.

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GLOSSARY

Bagasse:

It is by product of sugarcane after juice extraction. It is used as a biofuel and in the manufacture of pulp and paper products.

G&T :

Grand and Toy. The Company that supplies wood fibre paper to UBC. They launched their sustainability pillars in 2007. This company has similar environmental preference as UBC: products have a minimum of 30% post-consumer waste and products have a traditional attribute that makes them better alternatives to standard products.

TBL:

Triple Bottom Line assessment. This assessment helps to choose what products to buy, what technologies to use, and what their strategic direction should be and to check whether a product is fair-trade certified or not.

UBC:

University of British Columbia. University in BC that embraces sustainability in the community and makes an effort to advance sustainability on campus. UBC has set the most aggressive greenhouse gas emission reduction targets of any of the top 40 universities in the world.

Deforestation:

Trees and forest has been removed from forest for human needs that transform the land into non-forest. Deforestation implies the long-term or permanent loss of forest cover and its transformation into another land use.

Post Consumer Recycled Paper:

Post consumer recycled paper consists of any paper product recycled from what has passed through the consumer use and disposal cycle, such as newspaper, magazines, and phonebooks.

1.0 INTRODUCTION

The University of British Columbia (UBC) strives to become a global leader in campus sustainability throughout Canada. In order to meet the sustainability requirements, the UBC Supply Management commits to seek for sustainable products to be used on campus. Paula Goldspink, who is from the Category Management and Sustainability Program, is currently looking for an alternative for wood fibre paper. Two main suppliers for wood fibre paper and sugar cane paper are Grand & Toy and TreeZero respectively. The sugar cane paper, provided by TreeZero, are manufactured in Columbia and claimed to be more sustainable than the 30% recycled wood fibre paper UBC currently uses. This report aims to provide a thorough analysis of both the wood fibre paper and sugar cane paper using the triple bottom line assessment (TBL). The purpose of this report is also to help Paula with the decision making process by analyse the possibility of switching to sugar cane fibre paper. Three main topics (social, environmental and economic impacts) are being discussed throughout the report and aims to assess the benefits of adopting sugar cane fibre paper over 30% recycled wood fibre paper.

2.0 ENVIRONMENTAL

Major concern that UBC sustainability has is environmental issues. Most of papers in the world are still made of wood fibre. Producing paper requires significant inputs of energy, water, and raw materials. However, as using papers are inevitable in university life, UBC is attempting to find alternative of wood-fibre paper that UBC is currently purchasing from Grand & Toy and TreeZero. The major issue of wood fibre paper, deforestation, and recycling of sugarcane paper will be analyzed and the findings will be discussed below.

2.1 DEFORESTATION

Trees and forests benefit environment in the community. It improves water quality, air quality, reduce erosion, summer temperature, and winter discomfort, and preserve the diversity of plants and animals. However, deforestation increases every year as agriculture, illegal logging, population growth, and urbanization grows. Paper making, which is wood fibre product is the main factor contributing to deforestation. Based on the data from UBC sustainability, the 82.7 million sheets of copy paper that UBC consumes yearly is equal amount of 6,360 trees to be cut down. To preserve trees and forestry, UBC should reduce its use of wood fibre papers.

Forests are being logged for paper pulp while they are deteriorating from the impacts of global warming. Deforestation is one of the major driver of global warming, responsible for up to 20 per cent of global greenhouse gas emissions- more than all the transportations in the world (Greenpeace, 2013)

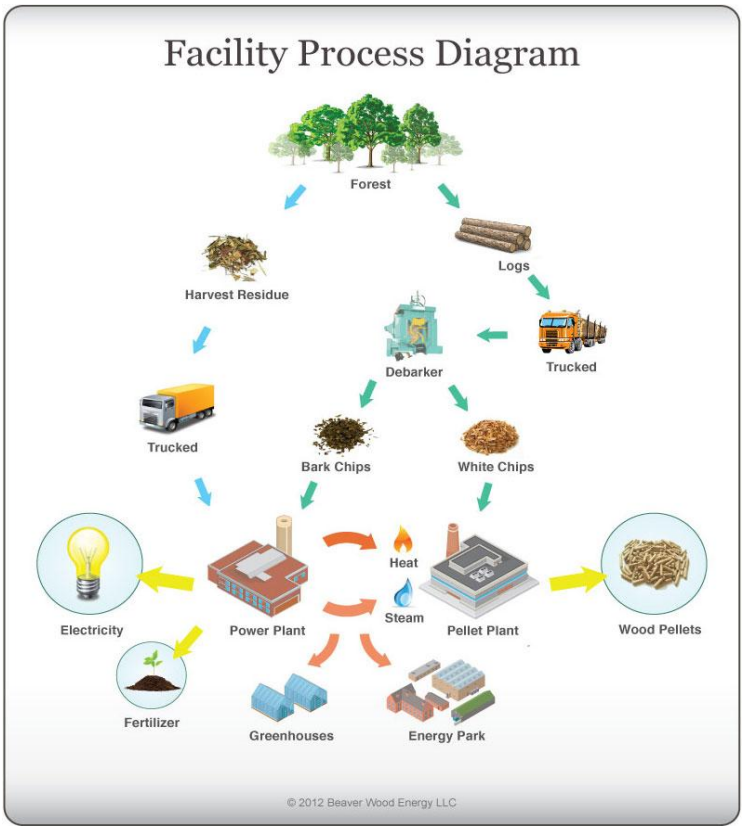

Figure 1. Facility Process Diagram of Wood

Today, trees are being cut and used in many purposes (see Figure 1). Reducing wood fibre paper products will support environment to save not only forest, but water, energy, and other sources as 83 millions sheets of copy paper used in UBC require 11,520 kilograms of air pollution to be emitted, enough water to run a shower for 5 years, and sufficient amount of oil for 39,025 years worth of oil changes (UBC sustainability, 2007).

Grand & Toy supplies wood-fibre paper made of trees in northern America which is mostly black spruce. Black spruce takes 10 years to reach 2-4m in height, 40 years to reach 12 m, and 280 years to reach 20m (Nature North, 2013) while sugarcane reproduces every 12 months (eHow, 2013). Because trees take longer to grow than sugarcane, reducing deforestation is difficult to be recovered.

Deforestation is severe global issue nowadays as it has huge effects on global warming. UBC sustainability's duty is to find an alternative way to save trees. UBC's considering company, Tree frog, merchandizes Sugarcane paper made of 100% sugar cane and recycled bamboo fibres (Kailing, 2010). Paper made of sugarcane is more reliable choice for UBC departments not to progress no more deforestation and save energies.

2.2 RECYCLE

2.2.1 POST-CONSUMER RECYCLED CONTENT PAPER IN UBC

UBC has a set a standard to purchase a paper that is consumed contains a minimum of 30 per cent post-consumer waste content. This brought UBC a good result in 2011 that 97 per cent of the paper purchased at UBC had recycled content of 30 per cent of greater (UBC sustainability, 2013). This post-consumer recycled content paper helps to reduce the amount of waste going into the landfill. Also, UBC agrees with the contract that 30 per cent post-consumer recycled content paper has same price as virgin paper.

2.2.2 RECYCLE OF SUGARCANE PAPER

After juice extraction, sugarcane fibre waste left is called bagasse. Sugarcane paper is made of bagasse which is by-product of sugarcane. Bagasse sugarcane products are fully biodegradable and compostable. The advantage of bagasse is faster biodegrading than wood-fiber. Bagasse biodegrades normally about 60-90 days while wood-fiber takes years depend on the type of the

tree (ecoKloud,2012). Sugarcane paper is also recyclable with paper made of wood-fibre (Shaigany, 2013). Sugarcane paper is renewable, reliable, and recyclable, but it renews and biodegrades faster than wood fibre paper. UBC has a standard of using paper that is 30 percent post-consumer waste content, and if both wood fibre and sugarcane paper can be recycled, sugarcane paper would be a better idea to encourage the purchase to make responsible environmental choices.

Figure 2. Life Cycle of Bagasse

3.0 ECONOMICAL

This section of the report discusses about the cost of producing 30% recycled wood fibre paper and the economics of the pulp and paper industry.

3.1 MANUFACTURING AND OPERATING COST OF WOOD FIBRE PAPER AND SUGAR CANE PAPER

The manufacturing and operating cost of both the 30% recycled wood fibre paper and sugar cane paper are explored in this section. The overall manufacturing cost is based on the cost of raw material, labour, pulping, bleaching and transportation. There was a limited access to information about the costs of these two types of paper, therefore costs for certain aspects were not known. The data below illustrates the manufacturing output and revenues of the 30% recycled wood fibre paper.

Manufacturing Output and Revenues*
($ billions)

Year	Manufacturing Revenues	Manufacturing Value-Added	Total Revenues
*****Prior to 2004, data covers incorporated establishments with employees, primarily engaged in manufacturing and with sales of manufactured goods equal or greater than $30,000. **Source:** Statistics Canada, special tabulation, unpublished data, Annual Survey of Manufactures, 2001 to 2003; Annual Survey of Manufactures and Logging, 2004 to 2010.			
2001	35.8	15.9	37.1
2002	34.2	14.4	35.3
2003	33.4	13.0	34.4
2004	33.7	13.2	35.1
2005	32.1	12.3	33.3
2006	30.2	11.7	31.4
2007	29.6	11.0	30.9

Manufacturing Output and Revenues* ($ billions)			
Year	**Manufacturing Revenues**	**Manufacturing Value-Added**	**Total Revenues**
2008	28.4	10.6	29.6
2009	24.5	8.8	25.5
2010	25.8	9.6	26.9

Table 1. Manufacturing Output and Revenues of Canadian Wood Fibre Paper

The data was obtained from a survey based on establishments rather than different companies. The cost of materials and supplies for manufacturing wood fibre paper in Canada is illustrated below.

Cost of Materials and Supplies* ($ billions)	
Year	**Cost of Materials and supplies**
***Prior to 2004, data covers incorporated establishments with employees, primarily engaged in manufacturing and with sales of manufactured goods equal or greater than $30,000. **Source:** Statistics Canada, special tabulation, unpublished data, Annual Survey of Manufactures, 2001 to 2003; Annual Survey of Manufactures and Logging, 2004 to 2010.	
2001	17.8
2002	17.6
2003	18.0
2004	17.1
2005	16.3

Cost of Materials and Supplies* ($ billions)	
Year	**Cost of Materials and supplies**
2006	15.0
2007	15.5
2008	14.8
2009	12.9
2010	13.4

Table 2. Cost of Materials and Supplies for Canadian Wood Fibre Paper

Unfortunately, there is no information on the manufacturing cost for the sugar cane paper because the manufacturing company believed that the information is confidential and should not be disclose. An assumption is made so that the manufacturing cost for sugarcane paper is close to wood fiber paper. Therefore, the manufacturing and operating cost for these two types of papers are not a huge difference.

3.2 ECONOMICS OF THE PULP AND PAPER INDUSTRY

The economics of the Columbian and Canadian pulp and paper industries are being discussed in this section. The pulp and paper industries from these two countries were investigated to determine the practicability and sustainability of manufacturing wood fibre paper and sugar cane paper in the long run.

3.2.1 Columbia

Due to Columbia's warm and humid climate, sugar cane plantation is feasible all year round. Hence, sugar cane is always available in Columbia as long as the sugar cane is able to grow in suitable conditions. Regrettably, there is no information regarding the sugarcane pulp and paper industry in Columbia because the information is considered confidential. An assumption is made that the sugar cane pulp and paper industry is similar to the 30% recycled wood fiber paper and met the international standards. The economy of the sugar cane paper industry is also based on the economy of the sugar cane farm.

3.2.2 Canada

Due to the climate of Canada, sugar cane farming is relatively unsuccessful. Therefore there are currently no paper mills in Canada that produces or manufactures sugar cane paper. The drive for producing sugar cane paper is growing as the cost of wood chips would become more expensive in the future. According to the data obtained from the University of Alberta, the cost difference per 500 sheets of 30% recycled wood fibre paper is around 5%. The data table for three categories of recycled wood fibre paper is illustrated below.

Product	Cost difference per 500 sheets (% increase)	Product specifics
Paper (8½ x 11")		
Paper with 30% recycled content*	5%	Boise Aspen 30 Multi-Use Paper
Paper with 50% recycled content*	34%	Boise Aspen 50 Multi-Use Paper
Paper with 100% recycled content*	36%	Boise Aspen 100 Multi-Use Paper

Table 3. Cost Difference for three categories of recycled wood fibre paper (University of Alberta)

4.0 SOCIAL

The social aspects of both the sugar cane paper and the wood fibre paper will be discussed in this section. The sugar cane farming industry as well as the pulp and wood paper industry are being explored and the impacts of these two industries on the community are also being considered. Before any recommendation is made to decide which type of paper is more suitable and sustainable to use in UBC, the performance and quality of these two types of paper are being tested and evaluated. According to Paula Goldspink, UBC is currently using copy paper provided by Grand and Toy (G&T). Both the sugar cane and wood fibre paper were tested in a laser and inkjet printer and they both performed equally well. As UBC requires the copy paper to have a minimum brightness level of 92 (Grand and Toy Canada, 2013), the paper provided by both companies (Grand and Toy and TreeZero) did meet the required level of brightness. The labour laws in Columbia were also being investigated to determine if the local farmers benefit from the sugar cane industry. It is determined that the sugar cane industry in Columbia met the labour standards of the workers and farmers.

4.1 SOCIAL IMPACTS ON THE PULP AND PAPER INDUSTRY

As pulp and paper mills are usually used to manufacture wood fibre paper, the impacts of transition from implementing sugar cane technology into the mills were also being discussed. This section examines the social impact of applying sugar cane technology on wood fibre pulp and paper mills.

Since sugar cane papers are made without any traces of wood chips, it is believed that sugar cane papers are sustainable and more suitable to use when wood chips are more expensive in near future. By using sugar cane paper, sustainability awareness will spread across the public and more people will be eager to purchase sugar cane paper as printing or copy paper. As informed by Paula Goldspink, UBC uses approximately 45 million sheets of paper each year. The table below illustrates the amount of paper used in UBC for the last three years.

Year	Amount of Wood Fibre Paper Used in UBC(sheets)
2010	53,040,018
2011	47,665,332
2012	40,712,550

Table4: Amount of Wood Fibre Paper Used in UBC for the Last Three Years

An assumption is made that if the wood pulp and paper mills were used to produce sugar cane paper, the same mills can still be used and the technology is similar. While the sugar cane paper requires no trees to be cut down, the demand of wood chips will eventually decline and this will be more sustainable.

In short, the sugar cane industry could create new jobs and increase the income of local farmers while having minimum impact on the wood fibre pulp and paper mills. By adopting sugar cane technology, the amount of trees to be cut down will eventually decline. As sugar cane paper uses only bagasse and without any wood chips, sugar cane bagasse can be used to manufacture paper after the sugar cane has been used as the food source for the local residents. Both the sugar cane industry and the local communities benefit in the sugar cane paper production.

4.2 BENEFITS FOR THE LOCAL FARMERS AND COMMUNITIES

There are large amounts of sugar cane bagasse produced each year after they have been used for various food sources. Instead of burning the excess and unwanted sugar cane bagasse, it is more sustainable to use it as a source for manufacturing paper. Columbia is one of the largest sugar cane producers in the world. The comparison of the sugar cane production average cost index for different countries are illustrated in the diagram below.

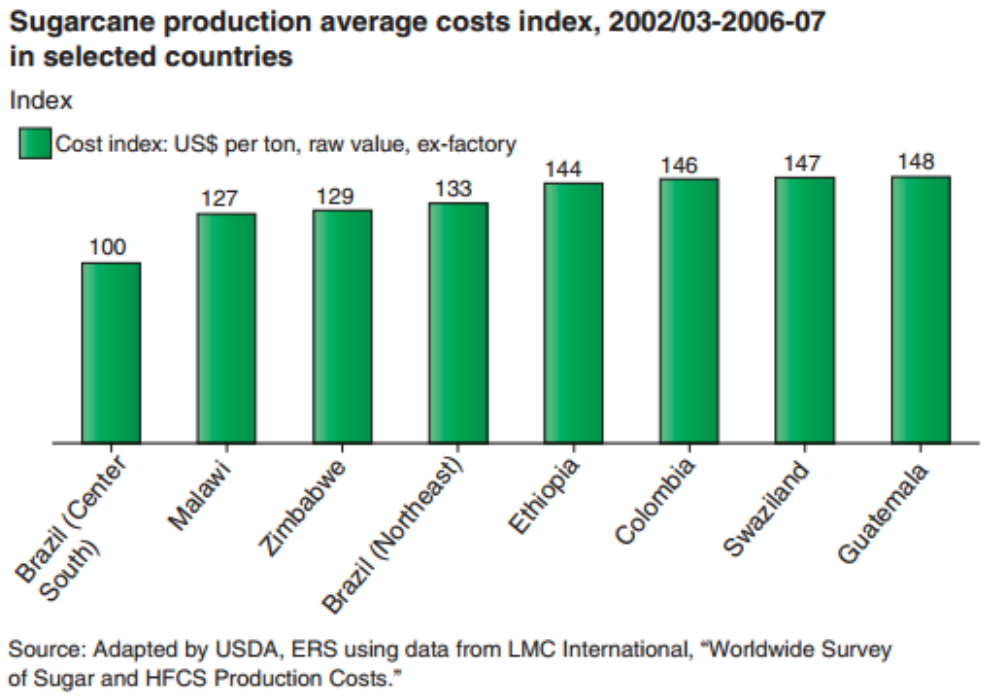

Figure 3. Sugarcane Production Average Costs Index In Selected Countries

As sugar cane is cheap and can be produced in bulk, the price for sugar cane paper is predicted to not increase dramatically in the future when compared to wood fibre paper. Jobs are also created for the farmers to collect, store and transport the sugar cane to the mills. The sugar cane by-product, harvested by a third party for sugar, is being transported to the nearby pulp and mills factory. (Nickel-Kailing, 2010)

Although there would not be thousands of positions available for the local sugar cane industry, there will be sufficient amount of jobs available for the local communities. In short, both the farmers and the sugar cane industry benefits from the sugar cane paper production.

5.0 RECOMMENDATIONS

In general, sugar cane paper has more advantages than wood fibre paper. It is recommended that UBC opt for sugar cane paper instead of 30% recycled wood fibre paper. According to the analysis carried out above, sugar cane paper is environmentally friendly and performed as well as recycled wood fiber paper. As UBC strives to achieve sustainability, choosing sugar cane paper will definitely increase UBC's image of sustainability throughout Canada.

For the environmental aspects of these two types of papers, sugar cane paper does not require trees to be cut down. Harmful air pollutants and water effluents released from the pulp and paper mills are much lower for sugar cane paper. Ecological footprint for sugar cane paper is also much lower than wood fibre paper. In the economic aspects, manufacturing and producing sugar cane paper can significantly aid in the sugar cane industry. As the supply of sugar cane bagasse is greater than the supply of wood chips, it is a viable option to select sugar cane paper. Furthermore, sugar cane bagasse is available in most tropical countries and the price is much cheaper than wood chips. This will result in improving the economy of sugar cane producing countries and tree consumption rate will gradually decrease in the future.

In terms of social aspect for this research, choosing to purchase and use sugar cane paper can greatly increase farmer's income and improve their standard of living. As sugar cane are mostly grown by local farmers, traditional way of growing sugar cane is preferable than conventional way of sugar cane cultivation. Hence, more job opportunities are being provided to the local farmers and workers of the sugar cane industry.

Furthermore, wood paper mills can be used to manufacture sugar cane paper and the recycling process of sugar cane paper is the same as wood fibre paper. Sugar cane paper manufacturing is environmentally friendly and economically practicable and thus UBC should switch from using wood fibre paper to sugar cane paper.

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