UBC Social Ecological Economic Development Studies (SEEDS) Student Report

An Investigation Into The Use of Recyclable Notebooks at UBC SUB Green Vending Machines: A Triple Bottom-Line Assessment

Syed Ahmed

Rayvier Dhak

Kevin Lin

Farhad Nazem

Mohammad Nazer

Jasper Yu

University of British Columbia

APSC 262

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Abstract

A significant amount of waste is generated at UBC through the use of disposable items such as chop sticks, food containers, and office supplies. To offset this waste the AMS is seeking to implement "green" vending machines that would allow students to purchase reusable/sustainable products. The purpose of this analysis is to provide the AMS with a recommendation for a sustainable notebook to be placed in the green vending machines. A triple bottom line analysis was conducted on the notebooks offered by two companies, Spector & Co. and ReBinder. Multiple sources of information, including published journals and articles, were used to develop a model of the ideal notebook for the UBC campus. The primary data, collected through surveys and company websites, was then used to determine which notebook was the closest to the ideal model, and a recommendation was given. Based on the conducted analysis, the ideal notebook for use on the UBC campus is Spector & Co.'s EC3210. Having the smallest cost per page, a high amount of recycled content, and hard cover, the EC3210 notebook was the closest to the ideal notebook model and is the one recommended for the AMS implement in their green vending machines.

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Glossary

Fiber – Class of materials that are continuous filaments or are in discrete elongated pieces, similar to lengths of thread.

Incinerator - An apparatus for burning waste material, primarily industrial waste, at high temperatures until it is reduced to ash.

Indentured Labour – a laborer or tradesman, under contract to an employer for a fixed period of time.

Stakeholder – A third party who temporarily holds money or property while its owner is still being determined.

Triple Bottom Line Analysis – Captures an expanded spectrum of values and criteria for measuring organizational success.

Uncoated Free sheet Paper – Paper which contains no more than 10% mechanical pulp.

Virgin Wood – consists of wood and other products such as bark and sawdust which have had no chemical treatments or finishes applied.

List of Abbreviations

Alma Mater Society	-	AMS
Post-Consumer Content	-	PCC
Post-Consumer Recycled	-	PCR
Student Union Bulding	-	SUB
University of British Columbia	-	UBC
Uncoated Freesheet Paper	-	UCFS

1.0 Introduction

There is great concern surrounding Canada's landfills exceeding capacity and recycling/using environmentally friendly products can help reduce the amount of waste entering our landfills. Sustainability can be defined as a long-term preservation of a certain level by considering the environmental, economic and social dimensions. Sustainability is becoming a more popular topic in our society and is the leading recommendation for reducing wastes.

One of the leading causes of solid waste pollution is paper products. The amount of paper which is disposed annually is enough to heat 50 million homes for 20 years. On the other hand, one ton of recycled paper uses 64% less energy, 50% less water, 74% less air pollution, saves 17 trees and creates 5 times more jobs than one ton of paper products from virgin wood. The University of British Columbia is attempting to become a leader with regards to sustainability. The new Student Union Building is an example of sustainable design. As a part of the new sustainable SUB, the AMS is investigating vending machines which offer sustainable and environmentally friendly products. One of the products available in these vending machines are recycled notebooks.

In order to evaluate the sustainability of the recycled notebooks, we are conducting the triple bottom line analysis. The triple bottom line analysis will examine the environmental, economic and social aspects of a product. Once the analysis is completed, one of the distributors will be recommended as the better option. The analysis compares two distributors, Spector&Co and ReBinder. The remainder of the report will provide a detailed outlook at the triple bottom line analysis and display our results and recommendations.

2.0 Social Aspects

2.1 INTRODUCTION

The purpose of adding recycled notebooks to the green vending machine is to promote the use of recyclable paper products in order to reduce the amount of waste being produced and trees being harvested. Another goal we wish to achieve is to help students realize that earth's supply of resources is limited therefore reusing materials and reducing consumption as much as possible is the key to preserving earth's resources. To achieve these goals, we conducted surveys to determine whether having recyclable notebooks would increase the social awareness among the students and staff as well to determine whether the notebooks will be socially acceptable.

2.2 COMPANY BACKGROUND

From our research we narrowed the notebook suppliers down to two companies, Rebinder and Spector&Co. Further research was done on the two companies to determine if the products are made in a safe workplace or if they use sweatshop labour. ReBinder supports no forced labour of any form including prison labour, indentured labour, or bonded labour. They don't employ anyone under the legal working age and they don't support child labour. At the work place, every employee is treated equally with respect and dignity. With regard to wage, employers are forced to pay the employees at least the minimum wage required by local law or the prevailing industry wage. ReBinder has all of their products made locally in Seattle, WA [Rebinder, n.d].

Spector&Co also ensures that there is no labour abuse or child labour under their discretion. They don't use any form of forced labour whether it be prison, indentured, bonded or slave labour. Regarding child labour, they don't hire anyone younger than the minimum age to be able to work in the country and Spectro&Co complies with all applicable wages, work hours, benefits, and overtime laws and regulations. Also, if the local industry standards are higher than the applicable laws and regulations, the higher

standard will be met. For the workplace, all laws and regulations for safety and health are followed with proper sanitation, lighting, ventilation in addition to fire safety protection being provided [Spector&Co, n.d].

2.3 SURVEY RESULTS

Recyclables notebooks do not cause harm to anyone's health or well-being and they don't contain any harmful materials making it safe to be sold to the public on campus. The notebooks will not create new job opportunities as they will be sold in vending machines in the new SUB, which will be controlled by the school. However, it may improve the student experience since UBC is known for playing a major role in supporting sustainability. With the recyclable notebooks being sold in the vending machines at UBC, the students will observed the schools commitment to a sustainable future. This can make students more aware of the importance of becoming environmentally friendly.

We were able to get 50 participants (each survey was conducted in the vicinity of the current SUB) and obtained their input regarding notebooks and whether they are popular among students. When asked whether they are currently using notebook, 52% said they currently use it while 48% don't use them. From the 48%, we asked for the reason why they don't use notebooks and it was found that the main reason was that students have no use for them with a few stating they are too expensive and doesn't provide a long lifetime. The next question we asked was if they knew the notebook was environmentally friendly and made from recycled products, would they pay more it since it will cost more to make compared to a notebook made from virgin wood. 40% said they would not spend more money, while 34% said they will and 26% was not sure. Following up, we asked what would be the range they would be willing to spend on a notebook, 20% said they would spend $0-$3, 42% said $3-$6, 6% said $6-$9, and 32% said they would not pay for a notebook. Our next question was regarding what features one would like to have in a notebook which they consider to be important, there was plenty of options provided and it was found that majority of students would prefer a hard cover,

small, lightweight notebook with a pen holder.

We want the notebook to increase the social awareness of sustainability and to achieve this goal we thought of having a contest to design a cover for the notebooks. The contest will have the students more involved and it can increase the awareness as they can learn more about the product and the purpose of the contest. If students realize the significance of the notebooks, the number of sales in the vending machines might also increase as they would support the cause. Our last question in the survey was based on the contest and asked the students if they would participate in a contest to design a cover or vote for a cover they would like to be on the notebooks. The results were 28% yes, while 22% was undecided and 50% said no. Even though majority of the students said they wouldn't participate, 28% said they would participate and it is still quite a bit as it can still help in increasing the awareness of sustainability by having the contest.

2.4 RECOMMENDED PRODUCTS

When searching for the right product, it's important to consider a large number of possible manufacturers in the initial stages of the analysis. After looking into many different companies, the list was narrowed down to two companies. The first of which, Spector & Co., is a 50-year old company that has offices around the world and offers a range of products but mainly specializes in office supplies. The second company, ReBinder, is a manufacturer of unique green office supplies with many of their products made to achieve a high degree of sustainability. Spector & Co is based in Saint-Laurent, Quebec and Rebinder is located in Seattle, Washington.

The ideal size for notebooks was determined to be approximately 5 inches wide and 7-8 inches long. This size would fit comfortably into the new SUB's vending machine and is a very convenient travel size for the students and staff on campus. After researching both companies, their notebook product lines were assessed to determine which notebooks would match the criteria obtained from the surveys. Ultimately, a decision was made to select one product from each. The following are the details of each product shown on the next page

1) Spector & Co.
    - EC3210
    - 5 by 7 inches
    - 80 sheets lined Kraft paper
    - Unit price (for a minimum bulk order of 125 units): $2.59
    - Paper: 70% Post-Consumer Recycled Fibers
    - Cover: Cardboard/ 70% Recycled

Figure 1 – Spectro&Co EC3210 Notebook

2) ReBinder
    - ReWrite Recycled Notebook
    - Cover: 18pt chipboard / 100% Recycled (85% PCR)
    - Size: 5 by 8 inches
    - 32 Sheets blank, graph or lined paper
    - Paper: 100% post-consumer Recycled Fibers
    - Unit price (minimum bulk order of 20): $2.50

Figure 2 – ReBinder Rewrite Recycled Notebook

3.0 Environmental Assessment

As the majority of material used in a notebook is comprised of paper, the main focus of this section will be on the environmental impact of notebook paper.

3.1 ADVANTAGES OF USING RECYCLED NOTEBOOKS

Compared with the notebooks made from virgin material, recycled notebooks conserve valuable raw material and landfill space. Instead of using only virgin wood pulp, recycled paper uses a combination of both the virgin wood pulp as well as waste paper which, was previously used and discarded. Virgin wood is still required because paper fibers are cut shorter each time a batch is recycled, and without the lengthy new fibers form the virgin pulp, the paper would be too weak to use. Since the actual papermaking process is indifferent for either material type, the benefit of using recycled paper is that less raw material is used in the production process.

Based on data from Environment Canada, over 10,000 landfill sites are currently in operation in Canada where nearly one third of the waste contained is paper and paperboard. [Waste Free Lunch, 2011] Although notebooks only hold a small percentage of paper products currently being used, switching to recycled notebooks can still have a major effect on our dependency on landfill space and raw materials. In addition, switching such an item that is so widely used on the UBC campus to an environmentally friendly version would increase the consumer's awareness towards environmentally friendly products. Therefore, other manufacturers would be encouraged to provide more environmentally friendly products which results in a virtuous cycle.

The environmental benefit stemming from the reduction in raw material consumption is that fewer trees need to be harvested which, results in a reduction in air pollution, water pollution, and solid waste [Dennings, 1999]. Due to the reduction in tree

harvesting, there are more living trees filtering carbon dioxide from the air and less vehicles transporting harvested logs. Furthermore, since the production of virgin wood pulp is reduced, there is less water being used. Lastly, by diverting paper waste, (which would have been sent to landfills or incinerators) into the production of recycled paper, there is less space occupied in landfills and, therefore, less pollution produced by incinerators. According to the data from Raven Recycling, each ton of recycled paper can save 17 trees, 380 gallons of oil, 7000 gallons of water, and 4000 kilowatts of energy [Raven Recycling, n.d]. Furthermore, the saved 17 trees can altogether absorb nearly 250 pounds of carbon dioxide from the air each year. Based on the total energy consumption and the total carbon dioxide emission shown in Figure 1, the UCFS with 100% recycled content consumes nearly half the energy and emits a third of carbon dioxide of the 0% recycled content. This shows that as the recycled content is increased, the energy consumption and carbon dioxide emissions (among various other pollutants) are reduced.

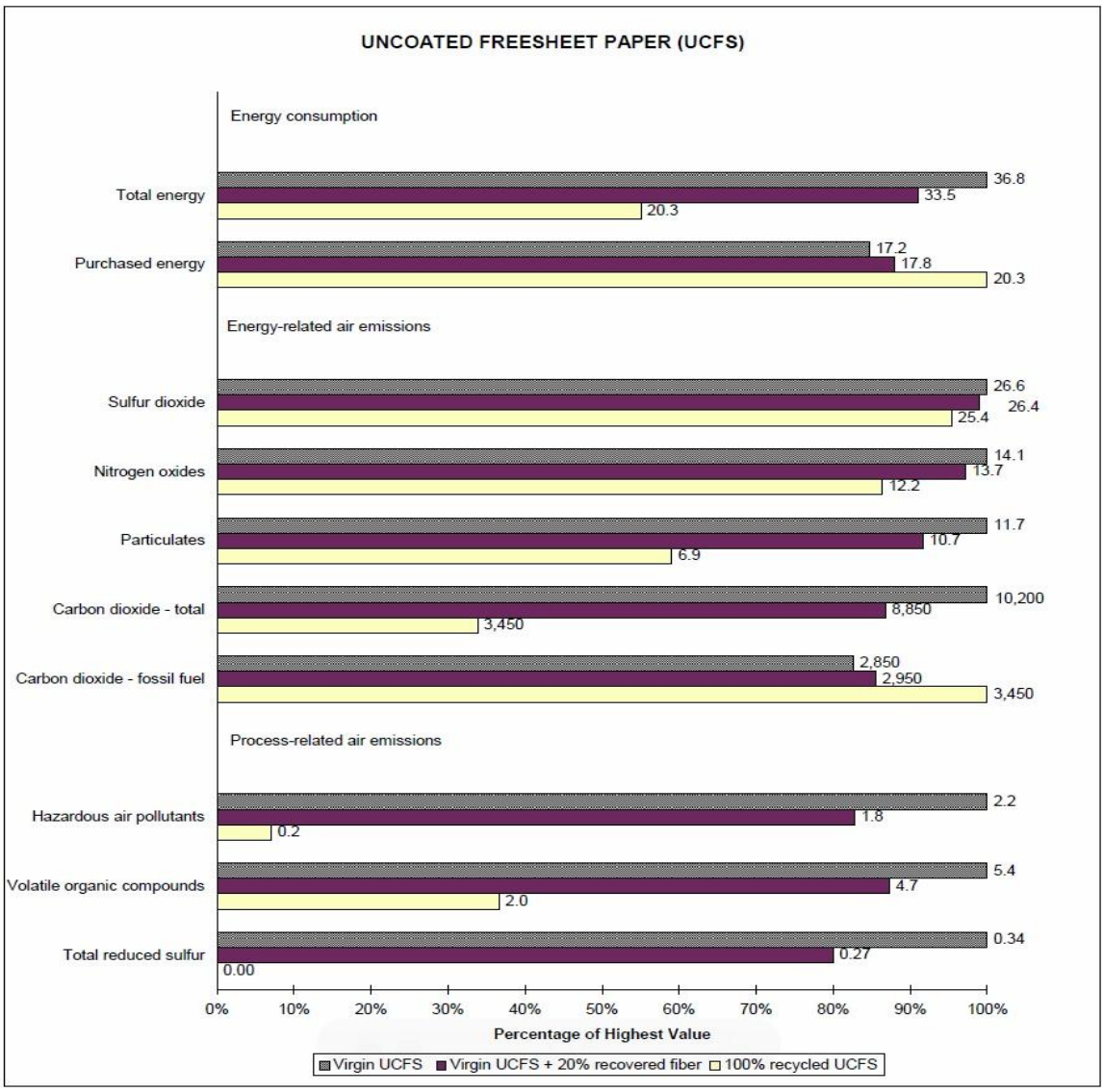

Figure 3- Environmental Parameters for UCFS with 0%, 20%, and 100 recycled content <http://apps.edf.org/documents/1629_WP10A.pdf>

3.2 RECOMMENDATION

Based on the information above, the result can be concluded that a notebook would be more environmentally friendly if its recycled content is higher. Both ReBinder and Spector & Co. offer notebooks with up to 100% recycled covers and papers. It is therefore difficult to determine which company's product is more sustainable based only

on recycled content of the materials used. However, ReBinder uses organic inks for their printing and also binds their notebooks without the use of plastic/metal rings.

Spector&Co. bind their notebooks with plastic rings and do not provide any information regarding the ink type used. Therefore, ReBinder notebooks would be the product which we recommend because it is slightly more sustainable than Spector & Co. due to the binding method and ink type used.

4.0 Economic Analysis

4.1 INTRODUCTION

In this section, we will analyze the impact this notebook will have on the local economy. To conduct this impact via comparison of other products, we are going to focus on two companies: Spector&Co and ReBinder. Certain indicators need to be considered when analyzing the economic impact of this product. The indicators we will look into during this section of the report are cost of purchase, recycling costs, and product lifespan. From these three areas of analysis, we will be able to recommend a product for the stakeholder to consider.

4.2 COST OF PURCHASE

For these two companies the items are mainly sold in bulk purchases, the unit price for each company differs by different bulk sizes. Our assumption is that since they are going to be purchased in bulk the unit price given in the following tables will provide sufficient information for the stakeholder's assessment of the proposal.

Quantity	Price	Unit Price
1-4 Cases	$49.99/case	$2.50
5-9 Cases	$47.49/case	$2.37
10+ Cases	$44.99/case	$2.25

Table 1 - Rebinder's ReWrite Recycled Notebook Cost of Purchase (Source: Rebinder.com and Spector&Co.com)

*Each case contains 20 units

*Free FedEx Shipping

Quantity(units)	150	250	500	1000	2500
Price	$2.59	$2.49	$2.39	$2.35	$2.29
Shipping Fee(UPS)	$37.48	$49.53	$84.72	$161.94	404.21
Unit Price (with shipping)	$2.84	$2.69	$2.56	$2.51	$2.45

Table 2 - Spector & Co. EC3210 Notebook Cost of Purchase (Source: Rebinder.com and Spector&Co.com)

Based on the tables given above, the unit price of Rebinder products is cheaper compared to Spector & Co., mainly because of the shipping cost and also keep in mind that each item has different features and specifications.

The EC3210 is made of 70% Post-Consumer Recycled (PCR) Fibers compared to ReWrite which is made out of 100% PCR [Rebinder,n.d] [Spector&Co, n.d]. This affects the total cost of the item because for a 100% recycled product materials needed only comes from one source, while anything less than 100% recycled means virgin wood materials and recycled materials are needed to produce the item, having more than one source could increase the overall cost.

In terms of, number of paper sheets per notebook, EC3210 holds 80 sheets of line kraft paper only while ReWrite holds 32 sheets with the option of blank, graph or lined paper. EC3210 does hold more sheets but is only available with one type of paper as for Rewrite you can have your choice of paper from the three options. This gives you more variety but less paper sheets to write on, also there is a one inch difference in length between the two items. Even though ReWrite is larger the number of sheets EC3210 holds is significantly more which makes the size difference insignificant.

Given in the table on the next page is the cost per sheet for each item, this will give the stakeholder an idea which item has better value for each sheet of paper.

	Spector & Co. EC3210		Rebinder ReWrite	
	Min. Order	Max. Order	Min. Order	Max. Order
Cost per Sheet	$0.0355	$0.031	$0.078	$0.070

Table 3 - Cost per Sheet (Source: Rebinder.com and Spector&Co.com)

4.3 RECYCLING COSTS

Our main focus in this section is on the recycling process of paper and its economic impact since this is the main material the notebook is composed of. The concern in question is whether or not it is financially and economically beneficial to recycle the paper again or to allow it to decompose in a landfill. Of course, the sustainable, environmentally conscious mind would strongly oppose the idea of landfills. Nowadays, through great technological advancements, we are able to create paper products made from 100 per cent recycled fibre. Depending on the magnitude of the recycled materials used, one can assess the economic impact this may have.

Encouraging the use of recycled paper will help save money in terms of government expenditures to operate landfills to throw away used paper and sorting costs. Based on some statistical facts, it shows that sorting used recyclable notebooks may induce extra costs, but what if the Student Union Building (SUB) were to designate bins specific to recycled notebooks [Dennings, 1999]. If this were the case, it could possibly lower the cost of recycling paper for this product. The Environmental Protection Agency article provided below shows the Generation and Recovery of Materials table, which shows that approximately 40% of landfill wastes are paper products. This would mean a reduction in land acquisition to allocate landfills if 100% recovery is achieved and instead be diverted for other uses that are beneficial to the economy. [United States Environmental Protection Agency, 2010] This could also potentially save communities from having to pay disposal costs, which can be very expensive. Additionally, through the sale of recycled materials, the new UBC SUB can offset the cost of their waste disposal, which means a possible reduction of expenditures.

Furthermore, an article released by the Environmental Paper Network revealed the following estimated values of how much is used to make 1 ton of 100% recycled paper compared to 1 ton of 100% virgin paper. [Environmental Paper Network, June 2007] This information can be seen in the table on next page:

Comparison of 100% Virgin Forest Fiber Copy Paper to 100% Postconsumer Recycled Content Copy Paper (Uncoated Freesheet) – For 1 Ton of Paper Use

	100% Virgin	100% Postconsumer	Savings (per ton)
Wood Use	3 tons	0 tons	3 tons (saves 24 trees)
Total Energy	38 million BTU's	22 million BTU's	17 million BTU's
Greenhouse Gases	5,690 lbs CO_2	3,582 lbs CO_2	2,108 lbs CO_2
Wastewater	19,075 gallons	10,325 gallons	8,750 gallons
Solid Waste	2,278 lbs	1,155 lbs	1,124 lbs

Environmental impact estimates were made using the Environmental Defense Paper Calculator, www.papercalculator.org.

Figure 4 - Recycled Paper and Virgin Paper Materials Consumption
source:(http://www.greenpressinitiative.org/documents/recycledfiberfactsheet-EPN.pdf)

The data above supports the recycling of paper, since recycled paper will be cheaper compared to fresh paper if the comparison is based off of material cost savings. The downside to using recycled paper are the extra costs from transporting, processing and selling recovered materials, which is estimated to cost from $50-$150 per ton. Compared to the disposal program that is estimated to cost from $70-$200 per ton, we can see that recycling is cheaper. This proves that recycling paper can be cost effective but still has room for improvement [United States Environmental Protection Agency, 2010].

We also investigated the issue of job opportunities created by recycling paper and found that for every 15,000 tons of old newspaper recycled, 30 jobs are created for paper collection, 40

jobs created for processing the paper, and 75 jobs are required for manufacturing the newsprint/recycled paper. Imagine the number of jobs that can be created if we continue to increase the recovery rate, this can help the Canadian government with unemployment problems, which in turn helps improve our economy.

With regards recycling costs for the notebook, when students and staff are throwing them away, the recycling process is exactly the same as recycling regular paper. Students and staff on campus will simply be able to throw these notebooks into the recycling bins for paper products. Thus, no additional recycling costs will be needed, since there is no special recycling process needed for these notebooks.

4.4 RECOMMENDATION

Considering the data provided above, if we were to base our decision from the unit price of each item, we would recommend Rebinder's ReWrite notebook, because it is cheaper compared to the Spector & Co. item. If we were to consider the cost per sheet, the Spector & Co. EC3210 is significantly cheaper which would be a better choice. In terms of recycling cost both items would incur similar costs, since both go through same recycling process. The difference would be the production cost due to the percentage of recycled content.

Overall, we recommend Spector & Co. EC3210 because in an economic point it is more sustainable and provides more advantages to the economy in terms of job creation and revenue generation.

5.0 Conclusion

Recyclable notebooks are a great way to provide sustainability awareness to the students at UBC. There isn't a clear cut choice which seems as the best recyclable notebook but after applying the triple bottom line analysis, we were able to determine which product is better than the other one.

The two products we have analyzed are EC3210 notebook from Spector & Co and the ReWrite Recycled Notebook from ReBinder. Both of these distributors supply notebooks which contain 100% recycled covers and papers. After evaluating the products with respect to the environmental, economic and social aspects, we were able to conclude that Spectro&Co is the better option because the EC3210 has the smallest cost per page, a high recycled content, and hard covers. The recyclable notebook EC3210 supplied by Spectro&Co is the recommended product for the "green" vending machines at the new SUB.

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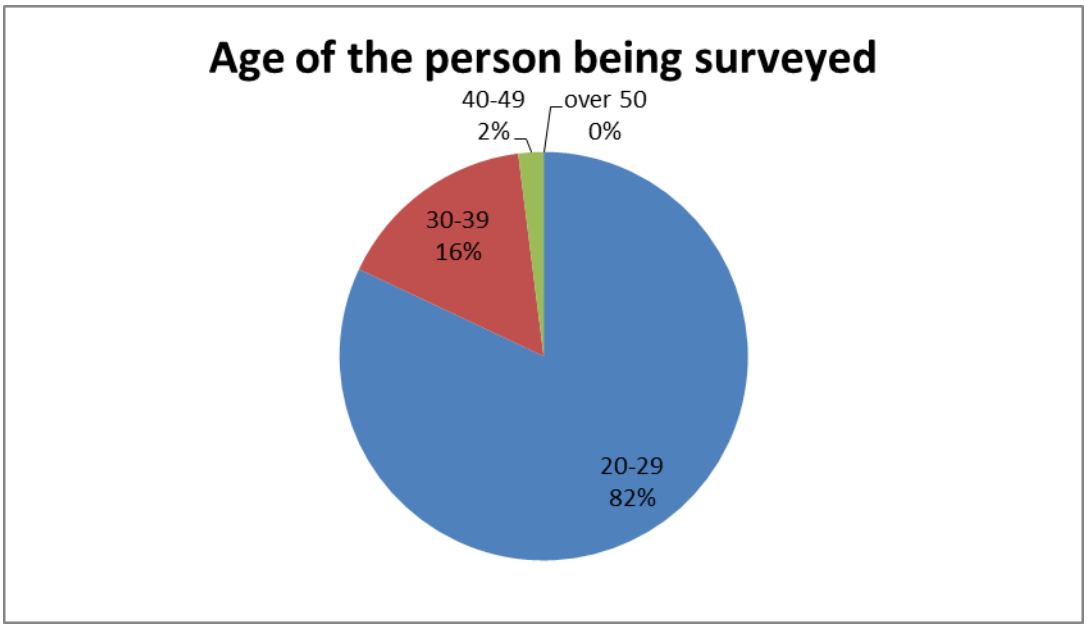
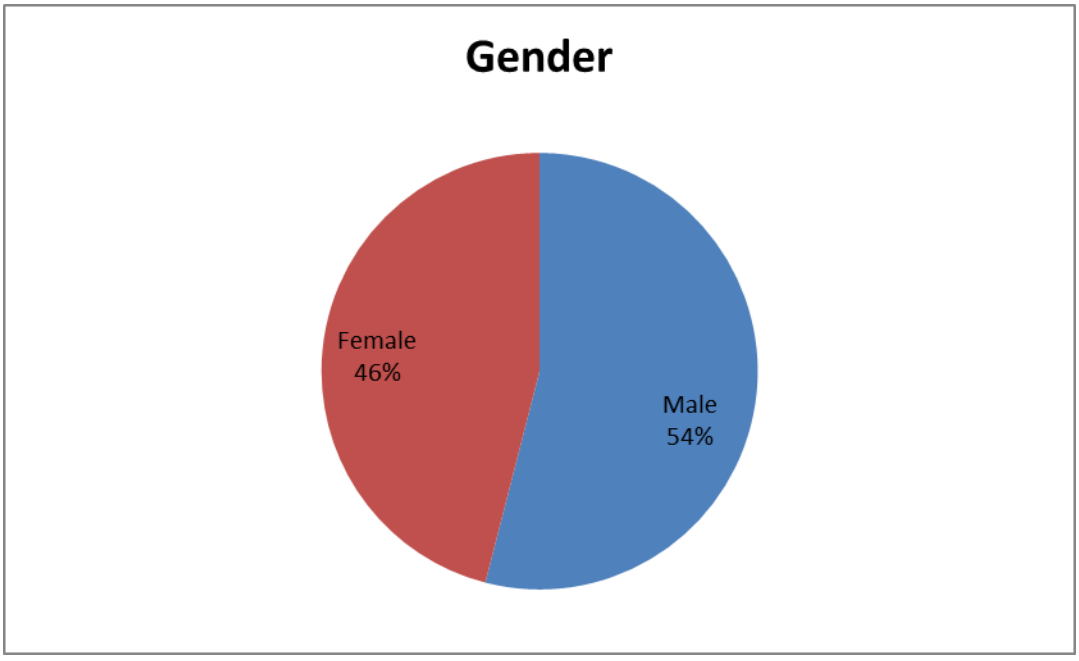
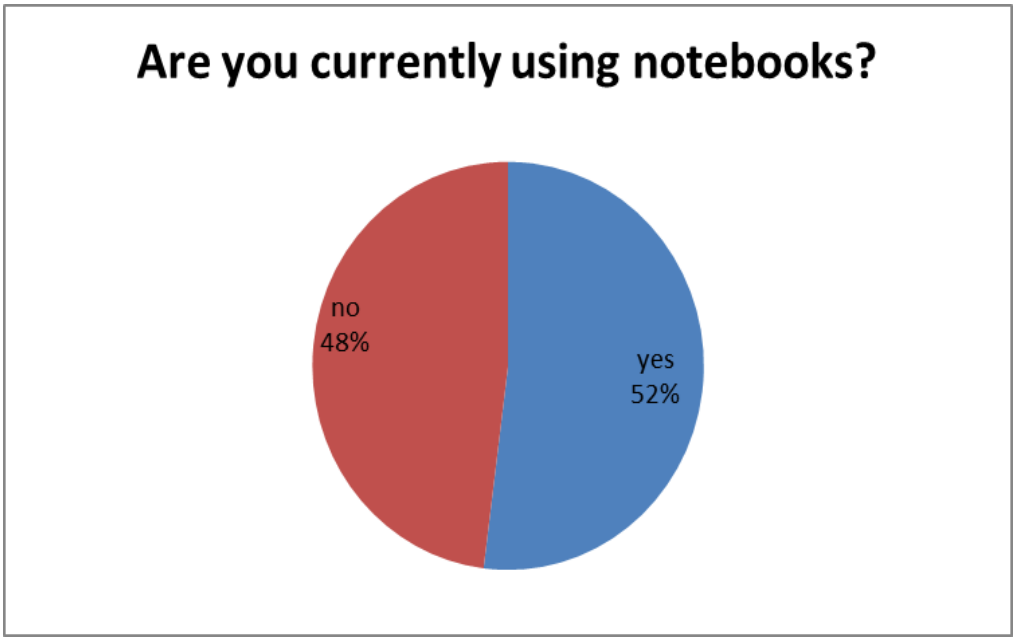
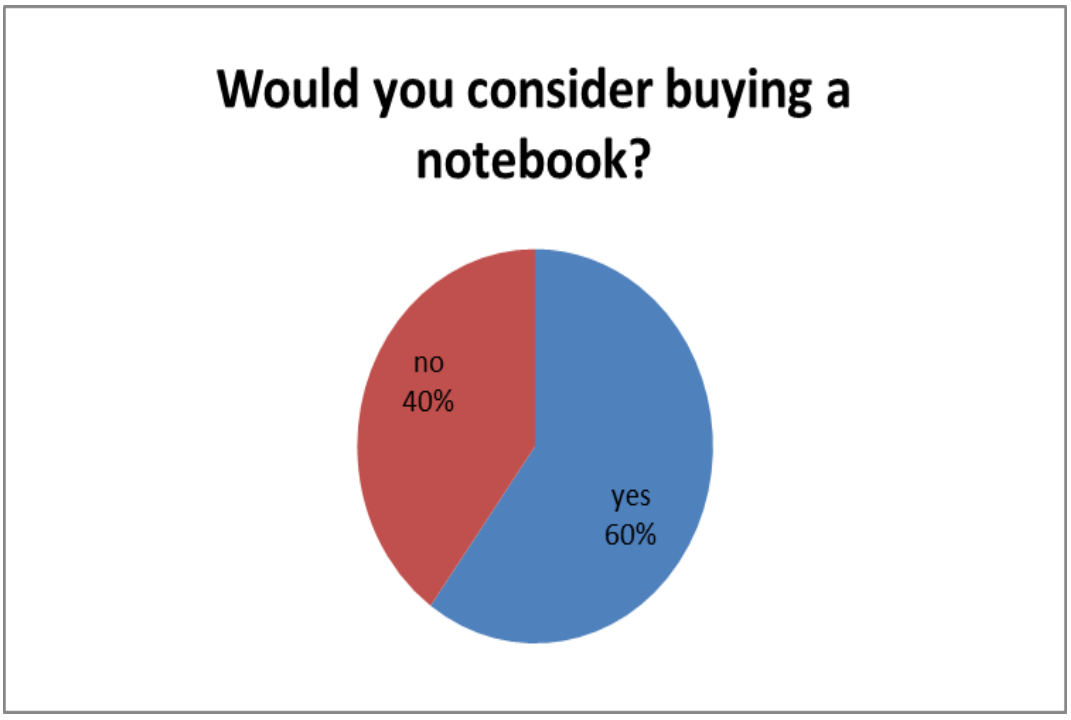
Appendix

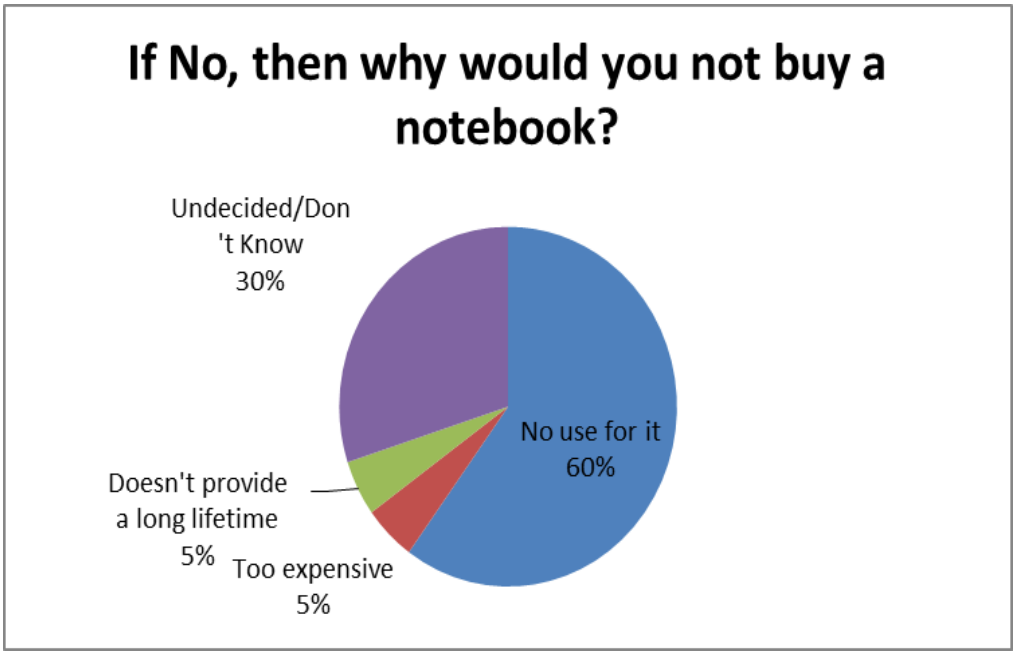
Surveys:

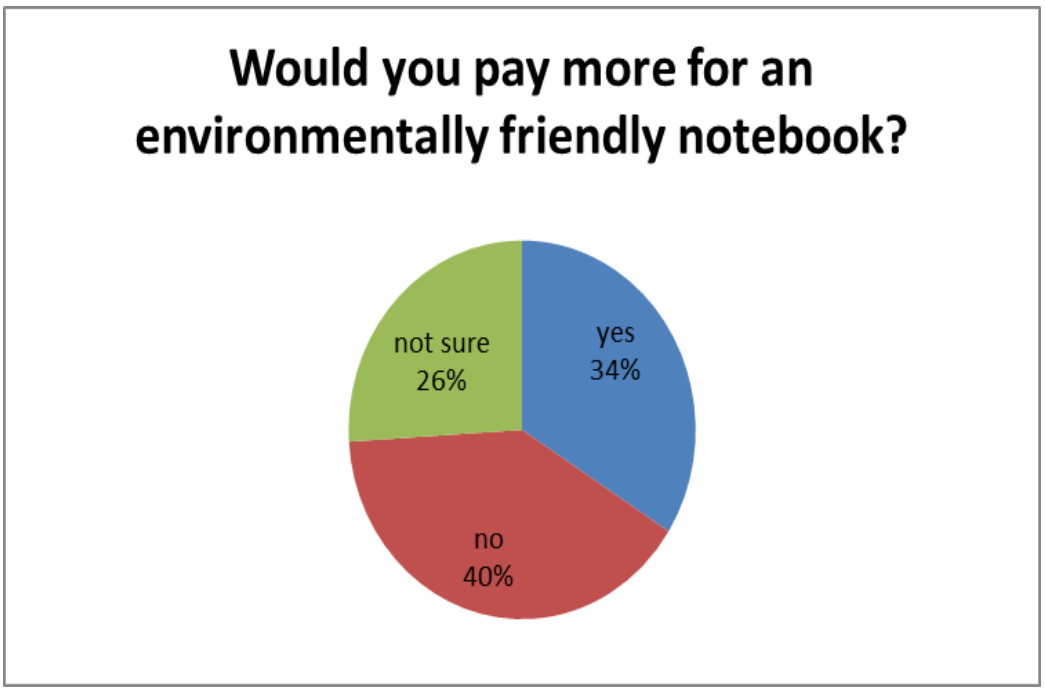


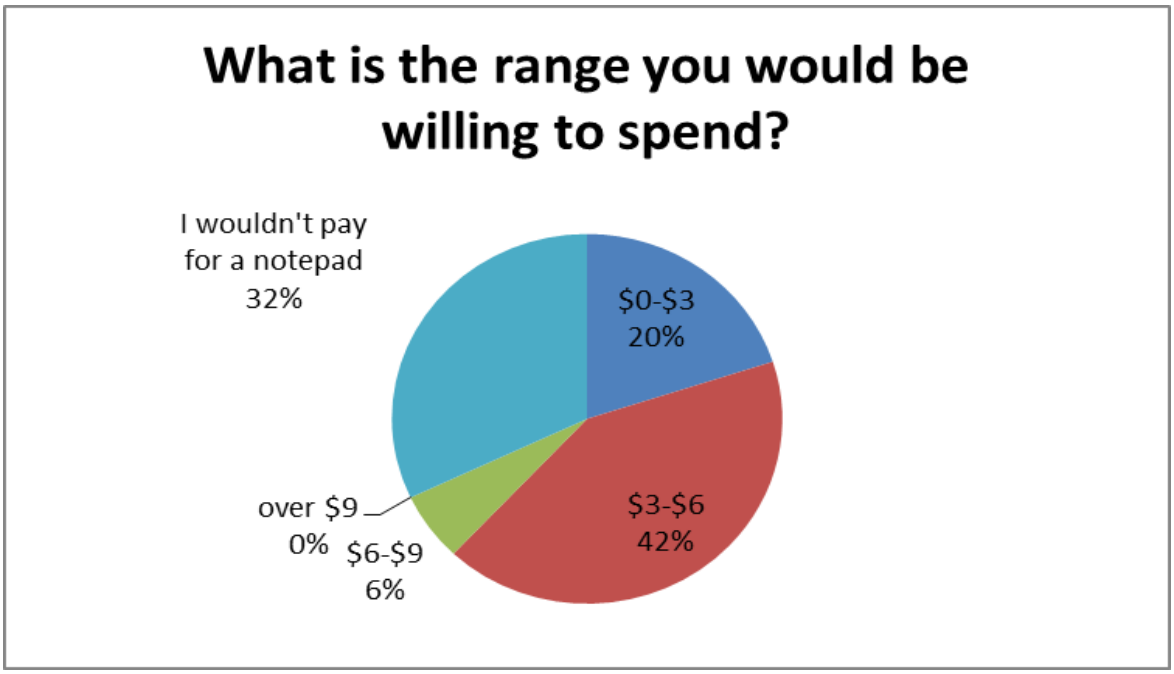


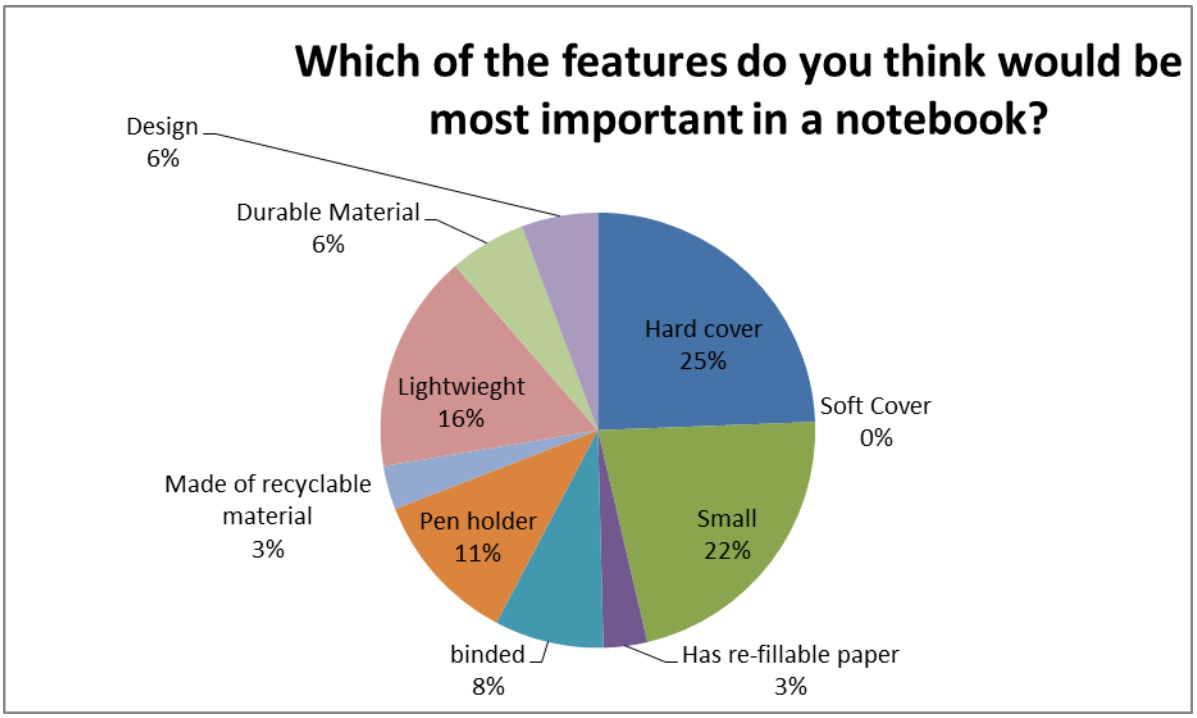

Are you currently using notebooks?
no
48%
yes
52%


Would you consider buying a notebook?
no
40%
yes
60%

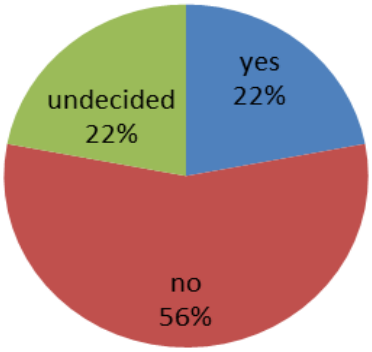

If No, then why would you not buy a notebook?
Undecided/Don 't Know 30%
No use for it 60%
Doesn't provide a long lifetime 5%
Too expensive 5%


Would you pay more for an environmentally friendly notebook?
not sure 26%
yes 34%
no 40%


What is the range you would be willing to spend?
I wouldn't pay for a notepad 32%
$0-$3 20%
$3-$6 42%
$6-$9 6%
over $9 0%


Which of the features do you think would be most important in a notebook?
Design 6%
Durable Material 6%
Hard cover 25%
Soft Cover 0%
Small 22%
Has re-fillable paper 3%
binded 8%
Pen holder 11%
Made of recyclable material 3%
Lightwieght 16%

Would you be inclined to purchase this notebook as a gift?



If there was a contest for desiging a cover for the notebook, would you participate in submitting a design or voting for a design you like?