

**An Investigation into Sustainable Cleaning Products**  
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**April 09, 2015**

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# An Investigation into Sustainable Cleaning Products



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April 9, 2015

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## ABSTRACT

Sustainable development aims at improving the quality of our lives to present and future generations, and being able to live in a healthy environment is indispensable and is a sign of good quality of life. UBC is committed to Sustainability, and always striving to create a safe and clean environment for students to work and study. During recent years, UBC has been promoting a zero-waste campus by encouraging actions such as eliminating as much waste as possible and reducing energy and water usage.

As a result, one immediate problem would be the usage of cleaning products. Using the right kind of cleaners not only promotes cleaning efficiency, but also helps reducing the environmental, economic and ecological impacts of cleaning products on campus. Therefore, to find out which cleaning products are most sustainable is the main concern. In this report, various kinds of cleaners are being investigated and reviewed, and the main focus is on All-Purpose Cleaner. A Triple-Bottom-Line analysis on social, economical, and environmental aspects was made on each type of the cleaners. Surveys on user preference were conducted among UBC students and custodial services superintendents. Also, the prices of cleaners were compared based on a cost per unit volume basis. Furthermore, many important aspects include biodegradability and toxic ingredients contained in those cleaners were assessed during investigation. Each type of cleaner has its own advantages and disadvantages, and In general this report recommends Green or Eco-Friendly Branded Cleaners to be the most sustainable cleaners.

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## GLOSSARY

<i>“Green(Branded)/Eco-Friendly Marketed”</i>	In terms of a cleaner’s packaging, the term refers to the common buzzwords used to describe a product that is “better for the environment” than related products
<i>Triple Bottom Line Assessment/Analysis</i>	A type of assessment that involves assessing a project or proposal from three different standpoints, those being financial, environmental and social, in order to fully address the impacts of such a project.
<i>Volumetric Costs</i>	Costs based on a certain volume of liquid; in this report, it refers to the cost per unit volume of all-purpose cleaner



## LIST OF ABBREVIATION

IFRA	International Fragrance Association
QRA	Quantitative Risk Assessment
RA	Resident Advisor
SAF	Sensitization Assessment Factors
TBL	Triple Bottom Line

## 1.0 INTRODUCTION

According to environmentalist, David Suzuki, Canadians spend more than \$275 million on household cleaning products in a year. Nowadays, cleaning products are everywhere around us, and they are essential for keeping indoor environment such as household and workplace safe and healthy. However, commonly available cleaning products in markets contain many types of chemicals that can harm our health and pollute the environment; even for some that are marked as “natural”, “green”, or “environmental-friendly”. These products somewhat contradict the purpose of “cleaning” when consider their possible side effects. Many people have no concept about what sustainable cleaners are. The purpose of this report is to investigate and assess which cleaning products are most sustainable, using a triple-bottom-line assessment. These are divided into 4 main categories of all purpose cleaners being, Homemade Solutions, General Commercial Cleaners, Green-Marketed Cleaners, and All-Natural Cleaners are being researched. The most ideal of these will be recommended for use in offices and student residences in UBC, promoting a sustainable campus by reducing environmental, economic, and ecological impacts of cleaning products on campus.

## 2.0 ECONOMICAL ASPECT

A key component of a Triple Bottom Line analysis is that of the financial assessment, which covers a project's cost-related information. The scope of this assessment is dependant on its clientele, which in for this project includes people such as office managers and student resident advisors (RAs) of UBC. As such, our team will primarily assess from a consumer point of view, focusing on the costs towards the consumer, as well as ease of access to the products in question.

To accomplish our assessment accurately, our team developed a criteria to determine both our test retailer as well the cleaners from said retailer to analyze, assessed and grouped the products into "families" of all-purpose cleaners, and finally collected and prepared the relevant financial data. This will be covered in the following sections.

### 2.1 ASSESSMENT CRITERIA

In order to minimize discrepancies during data gathering, a criteria was created to ensure a standardized assessment and was designed to reflect the needs of the consumer and our clients.

The key points of the criteria are as follows:

- The products must be purchasable from stores located on-campus or within "walking distance"
  - Due to the subjective nature of the term "walking distance", an exact distance or time travelled is not universally defined. For the purposes of our assessment, we considered walking distance to be within 3 kilometres or a 30 minute walk from the UBC Bookstore.
- The products chosen for comparison must all come from the same store (to avoid varied pricing between retailers).
- Cleaning products must be compared based on pre-taxed retail price, as well as volumetric cost per 100 mL of cleaner.

### Key points (continued)

- Cleaning products will be grouped into certain “families” of cleaner
  - These families are:
    - General, Non-Green Cleaners
    - Green/Eco-Friendly Marketed Cleaners
    - All-Natural Commercial cleaners
    - Homemade cleaners
- Commercial cleaners will be grouped based on how its packaging markets itself to consumers.

Considering retailer options, we chose to focus on the Save-On-Foods located in Westbrook village, as it was both within our travel parameters (1.8 km, according to Google Maps) and had a wide selection of all-purpose cleaners available, 11 of which were included in this report. The primary indicator used when differentiating between product families was the product’s packaging and marketing, which was largely relevant in distinguishing commercial cleaners only. Once the products were selected, we organized them into groups and begun collection and calculation of cost data.

## 2.2 COST ANALYSIS

The two biggest economic indicators that were assessed were the pre-tax retail cost of the cleaner itself, as well as the cost per 100mL of cleaning product. For each group, we compared purchasing costs between individual cleaners, as well as trends that would possibly suggest cost tiers between groups. The collected data was then organized into tables, detailing the brand of the cleaner, the label name, the volume in millilitres (mL) per container of cleaner, the listed retail price, and the volumetric cost per 100 mL of cleaner.

The retail cost was chosen to reflect the actual upfront cost of a given product to a consumer and serves as simple element for comparison between cleaners. However, retail cost does not necessarily take into account the volume and effective value of the cleaners themselves. To that degree, a cost analysis per 100 mL was also performed, 100 mL in particular being chosen to reflect realistic differences in terms of dollar notation.

## 2.2.1 GENERAL, NON-GREEN CLEANERS

**Table 1: General, Non-Green Cleaners Cost Breakdown**

<b>General, Non-Green Cleaners</b>				
<b>Brand</b>	<b>Label Name</b>	<b>Volume per Container (mL)</b>	<b>Retail Cost (Before Taxes)</b>	<b>Cost per 100 mL (rounded to 2 significant figures)</b>
Scrubbing Bubbles	Scrubbing Bubbles with Bleach All-Purpose Cleaner	650mL	\$4.29	\$0.66
Western Family	Ammonia	1800 mL	\$3.59	\$0.20
S.C. Johnson	Windex	765 mL	\$4.69	\$0.61
Western Family	Multi-Surface Cleaner with Bleach	650 mL	\$3.67	\$0.56
Lysol	All-Purpose Cleaner	650 mL	\$4.16	\$0.64
<b>Average Retail Cost of General, Non-Green Cleaner</b>			\$4.08	
<b>Average Cost per 100 mL of General, Non-Green Cleaner</b>				\$0.54

In the table above are the costs of several samples of non-green cleaners available for consumer purchase from our test retailer (that being Save-On-Foods). The criterion for a cleaner being classified as a non-green cleaner was that its outer packaging make no attempt at describing itself as an eco-friendly option, instead simply representing itself as a conventional, all-purpose cleaner.

As the data above shows, non-green cleaners tend to be priced fairly similarly, with the greatest deviation in price being the Western Family “Ammonia”, which is approximately 12% cheaper than the average retail price of \$4.08. Similarly, costs by volume tended around the calculated average of \$0.54 per 100 mL, with only the Western Family “Ammonia” deviating substantially from the average by more than 65%.

**Table 2: Green/Eco-Friendly Branded Cleaners Cost Breakdown**

<b>Green/Eco-Friendly Branded Cleaners</b>				
<b>Brand</b>	<b>Label Name</b>	<b>Volume per Container (mL)</b>	<b>Retail Cost (Before Taxes)</b>	<b>Cost per 100 mL (rounded to 2 significant figures)</b>
Green Works	Glass and Surface Cleaner	946 mL	\$4.39	\$0.46
Lysol	Power & Free Multipurpose Cleaner with Hydrogen Peroxide	650 mL	\$3.99	\$0.61
Spray Kleen	All-Purpose Cleaner (“Environment Friendly!”)	950 mL	\$6.39	\$0.67
<b>Average Retail Cost of Green/Eco-Friendly Branded Cleaners</b>			\$4.92	
<b>Average Cost per 100 mL of Green/Eco-Friendly Branded Cleaners</b>				\$0.58

Table 2 above shows the cost breakdown of the available samples gathered from the test retailer. To qualify as a Green/Eco-Friendly cleaner, the marketing on the container had to indicate that the product was a green-alternative to conventional cleaners. Such qualifiers include the brand name itself (i.e. the Clorox-brand “Green Works”), the mentioning of non-toxic chemical components (ex. Lysol Power and Free prominently claims itself as being a bleach-free cleaner) and taglines/slogans claiming eco-friendly sentiments on the packaging (Spray Kleen includes several such taglines, such as claiming their multi-purpose cleaner is “biodegradable”, “environment friendly, and “phosphate free”).

With regards towards costs, price deviation was greater than with the previous, non-green cleaners. Looking at both the average retail cost, it becomes apparent that green/eco-friendly cleaners tend to be more expensive than non-green cleaners, with nearly a dollar increase in average costs. Increases in the volumetric costs are less dramatic, however, with only a \$0.04, or ~7% increase from non-green to green cleaners.

**Table 3: All-Natural Commercial Cleaner Cost Breakdown**

<b>All-Natural Commercial Cleaners</b>				
<b>Brand</b>	<b>Label Name</b>	<b>Volume per Container (mL)</b>	<b>Retail Cost (Before Taxes)</b>	<b>Cost per 100 mL (rounded to 2 significant figures)</b>
Attitude	All-Purpose Cleaner	800 mL	\$5.09	\$0.64
Nature Clean	Multi-Surface Cleaner 99.2% Natural	946 mL	\$6.29	\$0.66
Method	All-Purpose Natural Surface Cleaner	828 mL	\$5.49	\$0.66
<b>Average Retail Cost of All-Natural Commercial Cleaners</b>			\$5.62	
<b>Average Cost per 100 mL of All-Natural Commercial Cleaners</b>				\$0.65

Table 3 above shows the cost distribution of the all-natural commercial cleaner examples found within our test retailer. The retail costs between each of the samples is similar to the non-green cleaners, but with a tighter price grouping compared to the green-branded cleaners. Indicators used to determine if an all-purpose cleaner qualified as all-natural were largely determined by whether or not the product was marketed explicitly as “all-natural” vs. “green/eco-friendly”, as well as if the ingredient lists reflected more “natural” ingredients. Due to the subjectivity of what “natural ingredients” are, it was decided that the functional definition of natural ingredients would be plant-based derivatives, and that an all-natural cleaner would almost-entirely be composed of said natural ingredients.

Looking at the retail cost, one can see large deviations in the cost of the cleaners, with differences of up to \$0.60 from the average cost of \$5.62. A greater indicator is the cost per 100 mL. The average cost per 100 mL is both very similar across samples, and it is more expensive than both the conventional and green-branded cleaners.

## 2.2.4 HOMEMADE CLEANERS

The costs of homemade cleaners are unfortunately too wide to tabulate, due to the variety of recipes available for usage. While many tend to use common ingredients such as vinegar, baking soda, essential oils and warm water, the quantities vary between recipes. As such, average volumetric costs, even between recipes with identical components, would not be representative of the costs and requirements to implement such cleaners.



**Figure 1:** An example of the marketing on a non-green cleaner (top-left), a green-branded cleaner (top-right), an all-natural commercial cleaner (bottom-left), and vinegar, a common component of homemade cleaners (bottom-right).



## 3.0 ENVIRONMENTAL ASPECT

Cleaning products are commonly used chemicals throughout a person's day. In order to keep our world sustainable and clean, it is necessary to discover the health concern and environmental impact that these chemicals may introduce to our surrounding. To investigate the environmental aspects of the triple bottom line assessment on the all purpose cleaning products, we focus on finding main chemical ingredients that may affect human beings as well as the environment.

### 3.1 GENERAL, NON-GREEN CLEANERS

General cleaners are the all purpose cleaners that we classified as the most common cleaner. They are easily found in any supermarket with massive quantity. They usually contain bleach and other powerful cleaning chemicals to achieve the sole purpose of effective cleaning.

#### 3.1.1 NEUTRAL CHEMICALS

Hydrogen peroxide:

This chemical generally causes minimal harm to human beings as it is usually found in low concentration, composing approximately 6% of aqueous cleaners. Although it does not pose as a serious environmental hazard, it is much less effective when compared to chloride based cleaners.

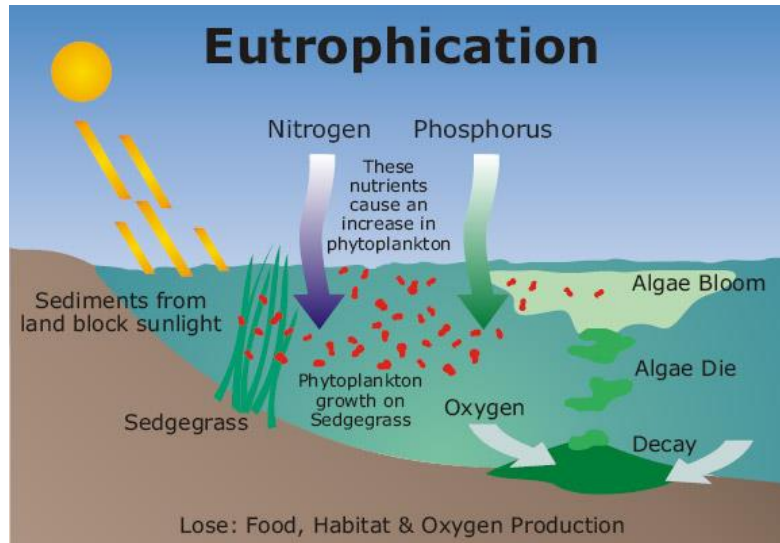
#### 3.1.1 HARMFUL CHEMICALS

Sodium hypochlorite

Also known as bleach, this common ingredient is found in most general, non-green cleaners. Its corrosive property causes burning upon contact with skin burning and severe eye irritation. However, the main concern of this chemical is its interaction with wastewater which forms multiple toxic compounds primarily being chloroform and carbon tetrachloride. Chloroform, under prolonged exposure, can cause dizziness, headache, respiratory attacks, heart attacks, as well as liver and kidney damage. Similarly, carbon tetrachloride is responsible for nerve damage, liver and kidney degeneration, and can even be fatal under concentrated amounts for extended periods.

## Phosphate

This chemical, in highly concentrated amounts, promotes cancer growth as well as algae growth in water, which has been known to adversely affect ecosystems by a process known as eutrophication. Prolonged exposure to cleaning products with phosphates can also cause dizziness and rashes.



**Figure 2:** Process Cycle of Eutrophication

From a purely environmental aspect, the consequences of using this cleaner type put the surrounding environment, wildlife, and user at significant risk and should not be recommended for use.

### 3.2 GREEN/ECO-FRIENDLY MARKETED CLEANERS

Green branded cleaners are the all purpose cleaners with marketed green labeled on their container. These cleaners focus not only on cleaning stains or grease but also on using environmentally friendly chemical ingredients. They contain both artificial chemicals as well as natural chemicals.

### 3.2.1 NEUTRAL CHEMICALS

#### Corn-based Ethanol

This alcohol is derived largely from corn and biodegrades easily and quickly after use without becoming a harmful by-product to the environment.

#### Decyl Glucoside

This is a plant-derived, biodegradable chemical that is harmless to both the environment and user throughout its lifecycle.

### 3.2.2 HARMFUL CHEMICALS

#### Sodium Octyl Sulfate

Sodium octyl sulfate is a soluble, solid chemical. Under prolonged contact, it acts as an irritant that causes mild, but chronic damage to skins and eyes. However, it should be noted that its irritant properties take place only if left untreated on target area.

#### Sodium citrate

This chemical referring to the salt of citric acid has slight effect if inhaled or ingested. Some common symptoms are abdominal pain or coughing.

#### Ethoxylated alcohol

This chemical is generally considered non-toxic, but its degradation by-product, nonylphenol, is toxic, causing hormone balance disruption in aquatic organisms which can then result in feminization in fish and premature deaths.

### 3.3 ALL NATURAL COMMERCIAL CLEANERS

In this type of cleaner, the main focus is to derive all ingredients from natural sources while retaining as much cleaning capability as possible. Manufacturers of all natural cleaners tend to emphasize its all natural property by adding essential oil or fragrance oil to produce pleasant smell.

#### 3.3.1 NEUTRAL CHEMICALS

##### Essential Oils

The ingredients of this oil is usually marked as trade secret; however, their chemical makeup is tested and approved by third-party certification organizations, such as IFRA (International Fragrance Association) before they can be implemented in the actual cleaner.

#### 3.3.2 HARMFUL CHEMICALS

##### Potassium hydrate

To enhance cleaning capabilities, some all natural commercial cleaners include potassium hydrate into their solution. In high concentrations, this chemical is highly toxic and corrosive and is capable of causing severe pain or swelling upon skin contact and vision loss. However, this ingredient is always heavily diluted and as such, poses minimal to negligible risk to the user. This substance also causes chronic long-term damage to marine food chains in high concentration, but low concentrations allow marine organisms to safely process and bypass the product.

### 3.4 HOMEMADE CLEANERS

In homemade cleaners, vinegar, soda ash, and water are common main ingredients. Due to their relatively non toxic nature, homemade cleaners are generally considered safer to use and dispose of. Although this kind of cleaner does not possess serious health concerns and is easy to make, some of its ingredients can be harmful when ingested in high concentrations.

### 3.4.1 NEUTRAL CHEMICALS

#### Essential Oils

Essential oils may be added to the solution at the discretion of the user, mainly in terms of smell preference. It does not possess serious health hazards, but in high concentration does cause skin burning. Due to its strong scent, scent sensitive individuals may find the smell uncomfortable. The following table provides the possible hazards of essential oil in different IFRA QRA categories.

Table 2: SAF and product type consumer exposure levels that drive the IFRA QRA categories.				
IFRA QRA category	SAF	Category consumer exposure 1 mg/cm <sup>2</sup> /day	Product type that drives the category consumer exposure level	Maximum pragmatic level
Category 1	300	11.70000	Lip products	Not necessary, acceptable exposure level derived from QRA
Category 2	300	9.10000	Deodorants/antiperspirants	Not necessary, acceptable exposure level derived from QRA
Category 3	300	2.20000	Hydroalcoholics for shaved skin	Not necessary, acceptable exposure level derived from QRA
Category 4	100	2.20000	Hydroalcoholics for unshaved skin	Not necessary, acceptable exposure level derived from QRA
Category 5	100	4.20000	Hand cream	Not necessary, acceptable exposure level derived from QRA
Category 6	100	1.40000	Mouthwash	Not necessary, acceptable exposure level derived from QRA
Category 7	300	4.40000	Intimate wipes	Not necessary, acceptable exposure level derived from QRA
Category 8	100	1.00000	Hair styling aids	<b>2%</b> The maximum concentration will not exceed 2% and may be lower if determined by the QRA
Category 9	100	0.20000	Rinse-off hair conditioners	<b>5%</b> The maximum concentration will not exceed 5% and may be lower if determined by the QRA
Category 10	100	0.10000	Hard surface cleaners	<b>2.5%</b> The maximum concentration will not exceed 2.5% and may be lower if determined by the QRA
Category 11	10	0.00033	Candles	These products result in negligible skin contact. The approach for a pragmatic concentration of fragrance ingredient in this category is explained in associated notes
The category consumer exposure level (mg/cm <sup>2</sup> /day) is driven by the product type in that category with the combined highest consumer exposure level and highest Sensitisation Assessment Factor (SAF).				

Figure 3: IFRA QRA Consumer Product Sensitization Factor Table

### 3.4.2 HARMFUL CHEMICALS

#### Soda ash

This is a common ingredient in almost all cleaning products. Ingesting a large amount will result in diarrhea or vomiting. Soda ash, also known as sodium carbonate, may react when mixed with lime dust to form a corrosive chemical known as sodium hydroxide. This compound causes mild burns upon skin contact as well as eye irritation. As a result, disposal measures must be taken in order to avoid creating this compound.

### 3.5 CONCLUSION OF ENVIRONMENTAL ASPECT

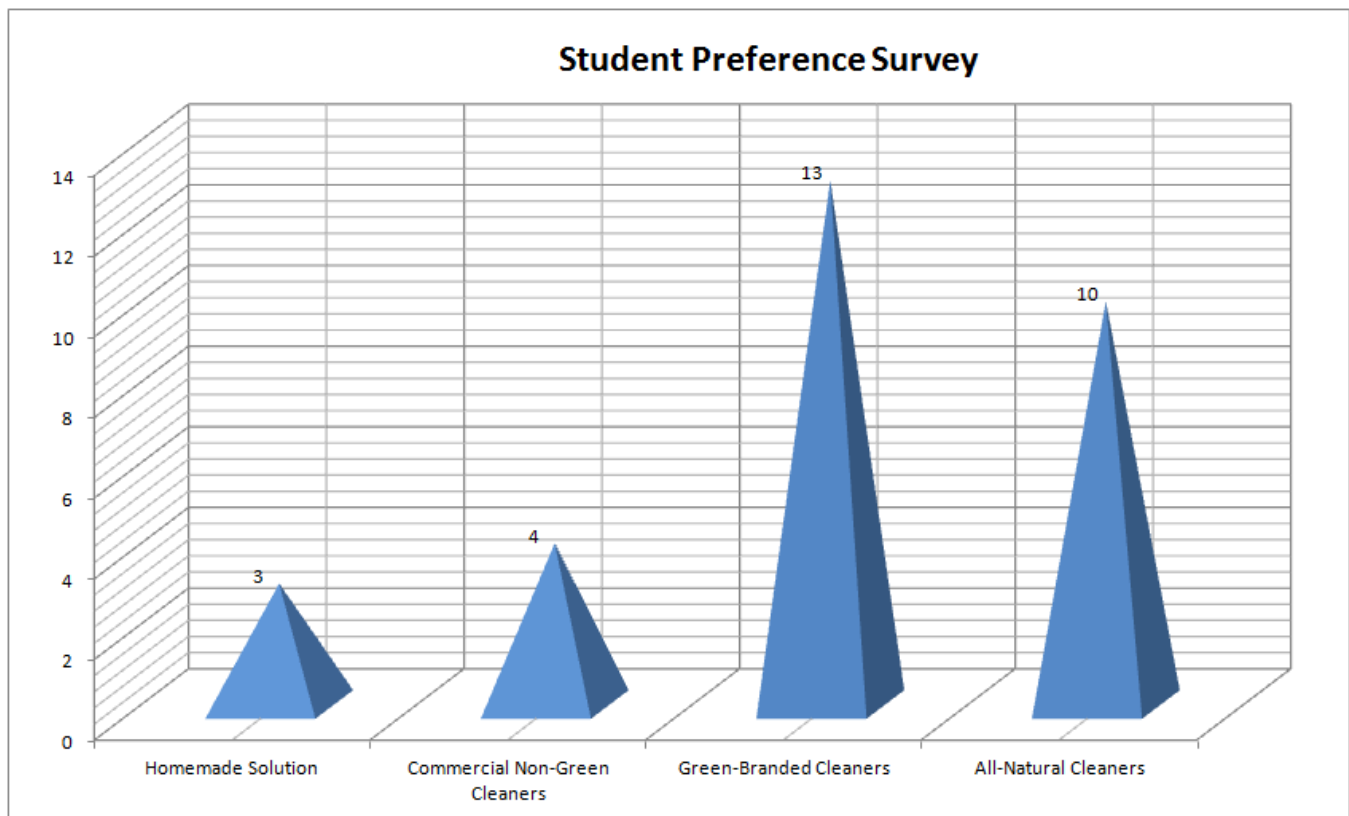
Chemicals within the All-Natural Cleaner do not pose any acute hazards or chronic effects but their byproducts are usually hazardous if not properly decomposed. As a result, in order to achieve a sustainable process, the disposal of its chemicals must be within well protected facilities to prevent potential toxic byproducts from entering our ecosystem. Regarding the packaging of the containers, only the all natural cleaner claims that their containers are 100% recyclable. Just by assessing the environmental factors, we would recommend to UBC staff and students the homemade cleaner option since it poses the least risk to the surrounding environment and wildlife as well as the user.

## 4.0 SOCIAL ASPECT

As part of the Triple Bottom Line Assessment, the social aspect plays a vital role in this investigation. Cleaners must be able to fulfill the expectations of society in order for it to be a viable choice, no matter how economically viable or environmentally friendly it is. In other words, consumer satisfaction is needed for products to be purchased. However, unlike the economical and environmental aspects of this investigation, the social aspect of the investigation cannot be simply measured. Factors such as performance, user preference, as well as sourcing play a role in determining which cleaner provides the greatest appeal.

## 4.1 USER PREFERENCE

In order to have a better understanding of each of the respective cleaners, a survey amongst university students ranging from 2nd to 4th year was conducted in identifying which cleaner presented the most appeal. The participating students were informed of our findings, as well as presented with an outlook of each of the cleaners and our anticipated recommendations.



**Figure 4:** Student Preference Survey

Results indicate the Green-Marketed Cleaners were the most preferred out of the available options, followed closely by All-Natural Cleaners. Commercial Non-Green cleaners were received with negative feedback concerning its hazardous chemical makeup and harmful potential in long-term use. Ranking last, homemade cleaning solutions were noted for their lack of harmful ingredients, but criticized for preparation inconvenience and weak cleaning capability.

## 4.2 PERFORMANCE

One of the most critical aspects to any cleaner from a social aspect is its capability in performing the task at hand; cleaning. In evaluating the performances of each of the cleaners, direct testing was conducted using set conditions to minimize errors. Given only 3 sprays, the four cleaners were tested in their effectiveness in removing a spread of **Nutella®** approximately 8 cm by 11 cm in surface area. All of the testing was based on a ceramic floor tile commonly found in household kitchens where multi-surface cleaners are handily used.

Concerning the physical portion of the test, a set 3-stroke pattern was consistently used for each of the trials to minimize uncertainties.



Figure 5: Before (left) and After (right) photos of cleaner performance test





**Figure 6:** After photos of cleaner performance test in close-up

Following our testing, we find that the General Non-Green Cleaner performed similarly to the Green-marketed Cleaner. The All-Natural Cleaner was more ineffective and was observed to smudge and smear rather than remove the **Nutella**® off the tile. The cleaning vinegar proved to be the most effective out of the four cleaners in terms of cleaning capability. However, it must be noted that most homemade solutions do not use pure vinegar but rather a substantially diluted form of both vinegar and baking soda. When performing a similar demonstration with the same conditions, the cleaning vinegar was replaced by a common homemade solution composed of  $\frac{1}{4}$  cup of vinegar,  $\frac{1}{2}$  cup of baking soda, and  $1 \frac{1}{2}$  cups of cold water. The homemade solution proved to be most ineffective compared to its counterparts, placing it slightly lower than the All Natural cleaner in terms of cleaning capability. Following these two tests, the cleaners were ranked for their performance with General Non-Green Cleaners and Green-marketed Cleaners as the most effective, followed by All-Natural Cleaners, and ending with the common homemade solution as the least effective.

### 4.3 SOURCING

In evaluating sustainability it is essential that not only the product and its by-products are analyzed but also the sourcing for its various ingredients. The Clorox Company, producer for our test product representing Green-Marketed Cleaners, follows strict regulations in evaluating potential suppliers as well as presenting priority for supplier contracts to minority, women, and disabled veteran-owned business enterprises. Clorox requires all its suppliers to self-certify,

through 3<sup>rd</sup> party organizations, as evidence that they comply by the Clorox Business Partner Code of Conduct. Within this Code, Clorox requires all suppliers to:

- Provide workplace that is free from unlawful harassment, sexual exploitation and abuse, and verbal and physical abuse
- Comply with Discrimination and Harassment Laws
- Comply with all applicable wage and hour laws (maximum hours worked per day, minimum wage etc.)
- Prohibit human trafficking and slavery
- Establish Occupational Safety Procedures that are deemed satisfactory to Clorox standards

Western Family, the producer of our test product representing General Non-Green Cleaners, did not provide any information regarding its sourcing or requirements for suppliers.

Method Products, producer of our test product representing All-Natural Cleaners, provided third-party certification from MBDC (Mcdonough Braungart Design Chemistry), an independent environmental research institute, for material assessment in their ingredients. MBDC has certified that 75% all ingredients in Method's products are gold-level certified. In addition, Method Products packaging is created using only recovered ocean plastic and post-consumer recycled plastic.

## 5.0 CONCLUSION AND RECOMMENDATIONS

Upon the assessment and analysis of four types of All-Purpose cleaners, it is found that each type has its own merits and weaknesses. From the Triple-Bottom-Line point of view, it is not hard to see each of these cleaners stressing more on some aspects while putting less emphasis on other important issues at the same time. The Homemade Solutions are made of all natural ingredients and can be prepared most of the time, but they would require more effort to make and generally have weaker cleaning ability than others. The General or Non-Green Cleaners are cost effective than any other types of cleaners; however, they are the least environmental-friendly cleaners as well and could cause many serious health hazards. The Green-Marketed Cleaners are the most suitable for long-term use because they contain significantly less amount of harmful chemicals, but they are not effective as General Non-Green Cleaners. The All-Natural Cleaners have almost no health concerns and are the most environmental-friendly at the cost of high prices.

While it is difficult to judge which cleaner is the best, the recommendation would be the Green-Marketed Cleaners in terms of being the most sustainable. Investigation shows they are balanced among many attributes such as economical viable and environmental-friendly. They cause little or no health concerns and have fairly effective cleaning capability. The user preference survey also indicates many of UBC students would like to use Green-Marketed Cleaners. This type of cleaner is probably the best all-purpose cleaner options currently available in the marketplace and can replace the use of General Commercial Cleaners. They can be used almost everywhere includes office, classroom and student residence. In short, they not only meet the low cost requirement, but also help promoting a zero-waste campus.

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## What do you think?

As a UBC Student, which option would you prefer for UBC custodial staff to use on campus?

1. Homemade Solution
2. General, Non-Green Cleaner
3. Green-Branded Cleaner
4. All-Natural Cleaner

\*Questions were presented via PowerPoint slide, and responses gathered on blank slips of paper