

UNIVERSITY OF BRITISH COLUMBIA

# APSC 261

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## An Investigation into Bring Your Own Container Program

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## ABSTRACT

Alma Mater Society (AMS) intends to implement several of sustainable concepts into the new Student Union Building (SUB) to achieve better sustainability for the entire campus. The Bring Your Own Container (BYOC) concept is one of these new ideas being brought up. A BYOC food outlet does not provide any take-out containers and cups, and customers are required to bring their own containers. The purpose of this report is to investigate, using the triple-bottom line assessment, the feasibility of operating one of the eleven food outlets in the New SUB as a BYOC food outlet. In addition, recommendations on promoting this concept are provided.

Triple bottom line refers to decision making that takes into account of economic, environmental, and social impacts. For the economic aspect, monetary gain or loss for both food outlets and customers are considered. For environmental aspect, materials used for producing disposable and reusable containers, life cycles for both kinds of containers and energy consumption for using them are considered. For social aspect, interest of UBC students and UBC Food Services (UBCFS) staff into the BYOC concept, health issue of using disposable and reusable containers, and influence to the society brought by the concept are considered

Based on our results, BYOC concept is environmentally feasible with some restrictions; it is partially feasible in terms of social aspect and economically infeasible. Although the results are not optimistic, the BYOC concept is feasible as there is only one food outlet that will be operated with this concept. In terms of educational and testing purpose, this concept is worthwhile to be given a try. In order to promote its feasibility, more discount in the BYOC food outlet and more advisement about it are recommended.

## Contents

ABSTRACT.....	ii
LIST OF ILLUSTRATIONS .....	iv
GLOSSARY .....	iv
LIST OF ABBREVIATIONS.....	iv
1.0 INTRODUCTION .....	1
2.0 RESEARCH RESULTS .....	2
2.1 ECONOMIC ASPECT .....	2
2.1.0 FOOD OUTLETS’ POINT OF VIEW .....	2
2.1.1 CUSTOMERS’ POINT OF VIEW .....	3
2.1.2 OVERALL ECONOMIC INFLUENCE .....	4
2.2.0 ENVIRONMENTAL ASPECT .....	5
2.2.1 MATERIAL USE AND POLLUTION .....	5
2.2.1.1 DISPOSABLE CONTAINERS .....	5
2.2.1.2 REUSABLE CONTAINERS.....	6
2.2.2 LIFE CYCLE .....	7
2.2.3 ENERGY CONSUMPTION.....	8
2.3.0 SOCIAL ASPECT .....	9
2.3.1.0 DEGREE OF PARTICIPATION OF STUDENTS AND UBCFS STAFF IN THE BYOC CONCEPT .....	9
2.3.1.1 DEGREE OF PARTICIPATION OF STUDENTS IN THE BYOC CONCEPT .....	10
2.3.1.2 DEGREE OF PARTICIPATION OF UBCFS STAFF IN THE BYOC CONCEPT .....	12
2.3.2 THE IMPACT ON CUSTOMERS’ HEALTH.....	13
2.3.3 THE IMPACT ON THE SOCIETY .....	13
3.0 CONCLUSION AND RECOMMENDATION.....	15
REFERENCES .....	16
APPENDIX A – SURVEY RESULTS.....	18
APPENDIX B – INTERVIEW .....	19

## **LIST OF ILLUSTRATIONS**

Figure 1: Survey 1 results, pp. 2

Figure 2: Survey 2 results, pp. 3

Figure 3: Life Cycles of Reusable Containers and Disposable Containers, pp. 6

Figure 4: Survey of the preferred AMS food policy, pp. 8

## **GLOSSARY**

### **Triple Bottom Line Assessment:**

An investigation that looks into social, environmental, and economic impacts.

## **LIST OF ABBREVIATIONS**

**AMS** - Alma Mater Society

**BYOC** - Bring Your Own Container

**PS foam** - Polystyrene foam

**UBCFS** - UBC Food Services

**SUB** - Student Union Building

## **1.0 INTRODUCTION**

Disposable containers have been widely utilized in food outlets around the world. They have advantages over reusable containers in terms of price. Also, they do not need to be washed and easy to print and advertise. However, millions of disposable containers are being used and dumped everyday by food outlets. These containers take hundreds of year to decompose. Therefore, they lead to many environmental problems. By practicing the Bring Your Own Container concept in food outlets, we can reduce a significant amount of disposable containers used.

This report will give an in-depth investigation of the BYOC concept. Furthermore, its advantages and limitations are revealed by comparing with conventional food outlet system by conducting a triple bottom line assessment. Based on our results and findings, we will present the feasibility of operating one of the eleven food outlets in the New SUB as a BYOC outlet.

## 2.0 RESEARCH RESULTS

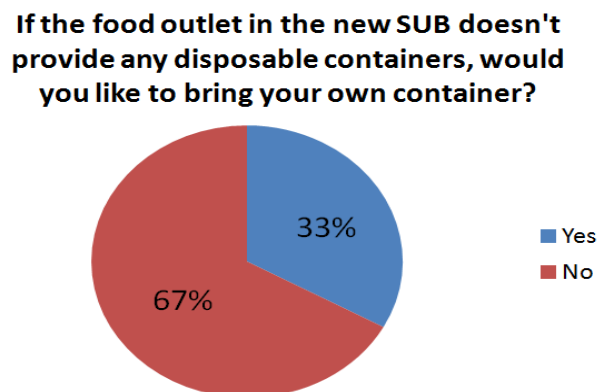
### 2.1 ECONOMIC ASPECT

“Each year, Americans dispose of 38 billion water bottles (\$1 billion dollars worth of plastic) in landfills. Just last year, Americans went through about 50 billion plastic water bottles, which translate to 167 per person and at a cost of \$15 billion. That’s more than Americans spent on iPods or movie tickets.”(Fishman, 2007) The following part discusses the feasibility of BYOC concept in terms of economic aspect. We consider the economic gain/loss of both food outlets and customers. The overall economic influence is also considered as well.

#### 2.1.0 FOOD OUTLETS’ POINT OF VIEW

We need to investigate the profit of food outlets when trying to implement this relatively new concept into the new SUB. This is because if they are losing lots of revenue with this procedure, then there is no way we can convince them into doing so.

Through our investigation, food outlets can cut down their cost even after providing discount to customers. However, their revenue can decrease at the same time due to the fact that over half of customers refuse to bring their own containers. With the customer model introduced in “International Journal of Production Economics”, the demand can decrease quite a lot, meaning less revenue for those food outlets (Busra Atamer). The following diagram (figure 1) shows how many people would like to bring their own containers if food outlets do not provide any disposable ones.



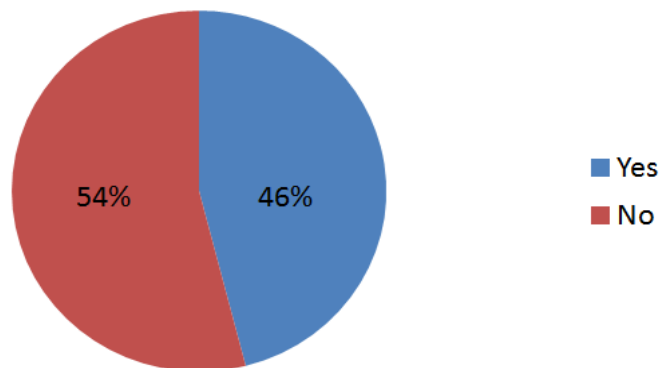
*Figure 1 - Survey 1 Results.*

Overall, food outlets actually lose money by implementing the BYOC concept. That is one major resistance to this concept.

### 2.1.1 CUSTOMERS' POINT OF VIEW

It is very important to consider the benefit for customers as they are the essential part of the BYOC program. That, in some way, reveals how likely they are to accept this change and be happy about it. In fact, customers can only take advantage of very slight discount with their own containers. “They can get 15 to 25 cents off any beverage or food purchase at all UBC Food Services, Starbucks and AMS outlets if they bring their own mug or container.”(Reusable Take out Containers) Therefore, most people prefer to have the convenience of disposable containers rather than save the almost unnoticeable money. And if they are forced to use reusable containers, they rather have the ones provided by the new SUB (if the new SUB provides). The following diagram shows how many customers would like to bring their own containers if new SUB provides reusable ones.

**If the food outlet in the new SUB provides reusable containers, would you still bring your own container for discount?**



*Figure 2 - Survey 2 Results.*

### **2.1.2 OVERALL ECONOMIC INFLUENCE**

The United States produces approximately 30 billion of plastic bottles each year and that is approximately 5 billion of dollars just for the raw material. There is no doubt the overall cost spent on containers will drop by a huge amount after implementing the BYOC concept. The cost to produce and decompose disposable containers is undoubtedly higher than manufacturing reusable ones, which can last much longer than the former.

In conclusion of the economic aspect, there is no significant differences between using disposable containers and bringing own containers for customers. But food outlets will surely lose customers and refuse to participate in such program. Therefore, unless UBC can force every food outlets in the campus area to implement the BYOC concept, the program is not quite economically feasible.



## **2.2.0 ENVIRONMENTAL ASPECT**

Disposable containers have played an important role as convenient and cheap take-out containers for both food outlets in UBC SUB and customers. Even though there are many advantages of using disposable containers, many problems also arise. The amount of resources used, energy consumed, and waste/pollution produced are currently high. The AMS wants to address these problems to promote a WasteFreeUBC by bring the BYOC concept into the New SUB. The rest of the paragraph provides an evaluation of environmental aspect of both disposable and reusable containers.

### **2.2.1 MATERIAL USE AND POLLUTION**

#### **2.2.1.1 DISPOSABLE CONTAINERS**

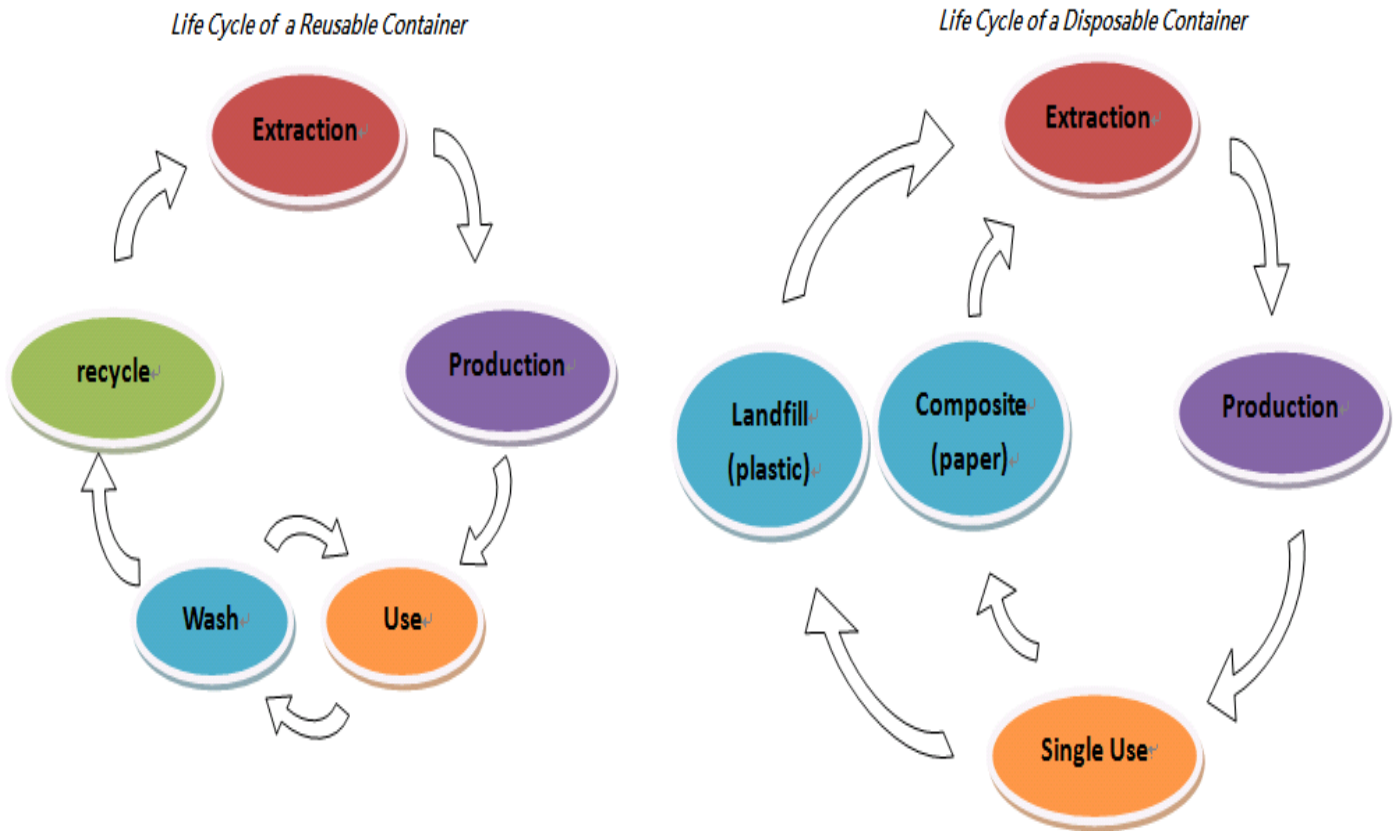
Two major material used to produce disposable containers are paper and PS foam. Paper disposable containers have been widely used around the world because they are cheap and biodegradable. Even though paper products are easily to dissolve in nature, a multitude of wood are needed to produce a sufficient amount of paper containers. Moreover, large amount of chemicals such as chlorine, sodium hydroxide, sodium chlorate, sulfuric acid, sulfur dioxide, and calcium hydroxide are used in the process of papermaking. Those chemical compounds are harmful to the environment by releasing the toxic water into the rivers (Hocking, 1991, p.504). Another common material used for producing disposable containers is PS foam which is a type of plastic. The process of extracting the raw material, crude oil, of plastic is “costly and sometimes environmentally damaging” (Chan, 2011, p.6). Manufacturing plastic containers also produces water and air pollutions. Since plastic is not compostable, it would take hundreds of years to break down in a landfill which is not environmental friendly.

### **2.2.1.2 REUSABLE CONTAINERS**

Reusable containers are normally made of plastic, and glass. Plastic is also a common material for reusable containers. Raw material used and pollution produced by making reusable containers are as the same as those from making disposable ones. Moreover, glass is another material that is widely used for making reusable containers. Production of glassware causes noise, water and air pollution. According to the research paper, An Investigation into Reusable Food Containers, noise comes from forming machines in glass factories. Those machines produce about 106 dBA noise levels (Chan, 2011, p.12). In addition, water acts as coolant in this industry. In fact, many manufacturers mix water with emulsified oil to cool down machines and products (Chan, 2011, p.12). The contaminated water is discarded to the ocean. Even though many factories have some systems to filter waste water before releasing it, the water dumped is still not 100% pure (Chan, 2011, p.12). Moreover, air pollution is one of major environmental problem. Producing glass products emits a large amount of nitrogen oxides and carbon dioxide which is harmful to the atmosphere. However, reusable glass containers could be used for thousand times. The total amount of pollution would be less than disposable containers after a certain number of uses of reusable ones.

### 2.2.2 LIFE CYCLE

Life Cycles for disposable and reusable containers are similar. They both start from extraction of raw materials for production but the stages are different after the containers are produced as figure 3 shown. Disposable containers are single use only where reusable containers can be used and washed numerous times. After use stage, used plastic disposable containers are



dumped into landfills and paper ones will be composited, whereas most of reusable containers will be recycled after their useful life. Then both life cycles will return to extraction.

*Figure 3: Life Cycles of Reusable Containers and Disposable Containers*

### 2.2.3 ENERGY CONSUMPTION

Energy consumed is one of the important indicators in the investigation of environmental impact. Comparing the amount of energy used for consuming reusable containers to it for consuming disposable containers can lead us to determine whether or not the BYOC concept is feasible to the UBC community. According to the calculations in the article Reusable and Disposable Cups: An Energy-Based Evaluation by Martin B. Hocking, energy consumption of producing one reusable container is much higher than it of producing one disposable container. Producing one uncoated disposable paper cup requires 549 kJ of energy, 198 kJ for moulded PS foam cup (Hocking, 1994, p.894). Moreover, the amount of energy needed to produce one heatproof glass cup is 5501 kJ and around 6300 kJ is required for producing one reusable polystyrene cup (Hocking, 1994, p. 894). Furthermore, extra energy, about 75 kJ, is needed to wash used containers. If the AMS wants to use reusable containers instead of disposable ones, each reusable container has to be used 15 to 450 times in order to make the total energy consumed of using a reusable container equal to the amount of energy required to make 15 to 450 disposable containers (Hocking, 1994, p. 894). Note that the numbers above may vary depending on different types of reusable and disposable containers used in the comparison. The number of uses of reusable containers is not the only subject that needs to be concerned. The return rate also affects the total energy consumed. A range of return rate from 93.8% to 99.8% is required to equalize the two numbers of total energy consumption (Hocking, 1994, p.897). Again, the value of percentage may change depending on different pair of comparisons.

### **2.3.0 SOCIAL ASPECT**

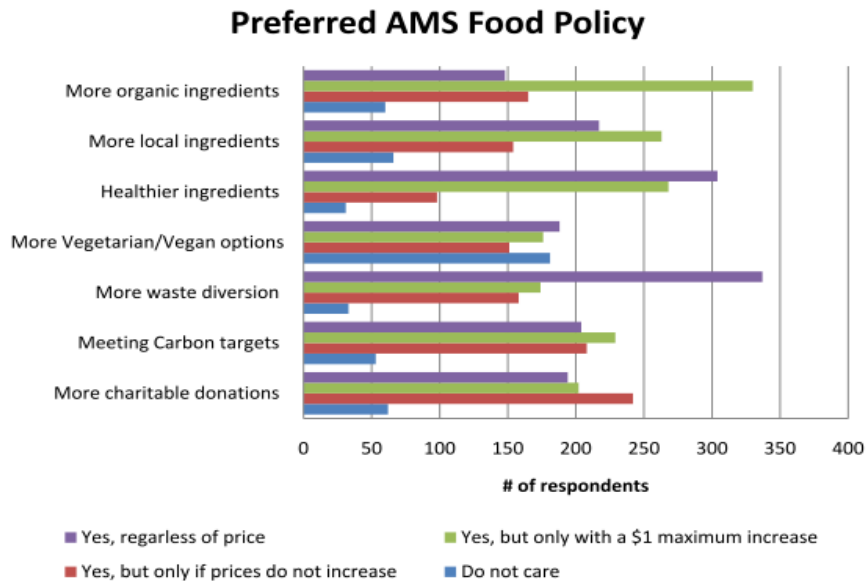
The following section discusses the feasibility of operating a Bring Your Own Container food outlet in terms of the social aspects. It puts a focus on the degree of participation of students and UBC Food Services staff in this concept, the impact on customers' health and on the society.

#### **2.3.1.0 DEGREE OF PARTICIPATION OF STUDENTS AND UBCFS STAFF IN THE BYOC CONCEPT**

The interest of students to the BYOC concept is taken into account when its feasibility is investigated. This is because their participation makes a big difference to the successfulness of this concept. If there are only a few students interested in the BYOC concept, then it is impossible to promote a waste-free campus. The interest of UBCFS staff in this concept plays an important role as well. This is because they are going to introduce this concept to the students on behalf of UBC. Therefore, their participation affects the awareness of this concept, as well as the efficiency of operating a BYOC food outlet.

### 2.3.1.1 DEGREE OF PARTICIPATION OF STUDENTS IN THE BYOC CONCEPT

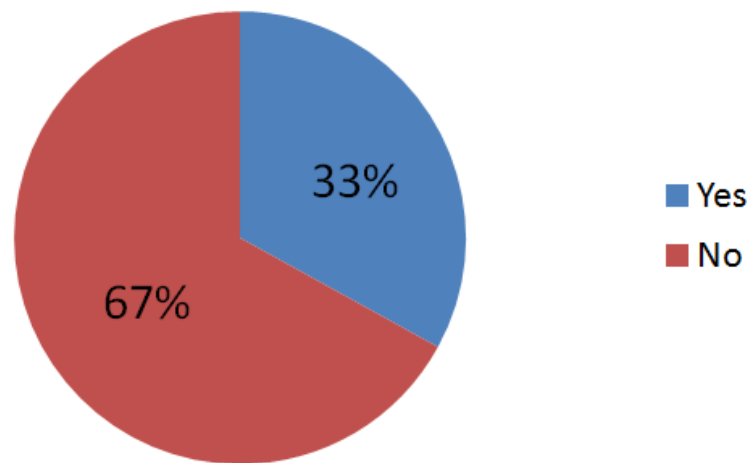
A survey concerning the new SUB was conducted by the SUB Renew Team in April 2009. 1,433 people were asked and only 7 of them were not students. One of the questions was about their preferred AMS food policy and the result is shown below (figure 4). There were a significant number of respondents claiming that they preferred more waste diversion regardless of the effect on the price of food. This shows that customers of the SUB preferred the SUB to operate more environmentally.



*Figure 4: Survey of the preferred AMS food policy  
(New SUB Program Survey Summary, 2009, p. 21)*

We conducted a survey from Nov 12 to Nov 14, 2012 to find students' preference on bringing their own containers if the food outlet in the new SUB is not going to provide any disposable container. 100 students were asked by the following question "If the food outlet in the new SUB doesn't provide any disposable containers, would you like to bring your own container?" More than half answered the question with "no" as shown in the pie chart below (figure 1).

**If the food outlet in the new SUB doesn't provide any disposable containers, would you like to bring your own container?**



*Figure 1: Survey 1 Result.*

Base on the survey of the preferred AMS food policy, students show their eager to studying in a waste-free campus. However, majority of students claimed that they did not want to bring their own container. One possible reason for this contradiction is that students do not want to take any responsibility in promoting a waste-free campus. Another possible reason is that bring a container makes them feel inconvenience.

### 2.3.1.2 DEGREE OF PARTICIPATION OF UBCFS STAFF IN THE BYOC CONCEPT

The Eco-To Go: Container Exchange Program is currently being executed in many food outlets in the UBC campus. This program is similar to the BYOC concept such that customers can bring their own container to those outlets and receive some discount. The Loop Cafe in Centre for Interactive Research on Sustainability is one of those food outlets participating in this program. Therefore, a short interview with their staff was conducted on 14 Nov, 2012. She said that the program did not increase her workload and she supported it.

Moreover, base on the feedback from the staff on UBCFS' sustainability work in the *Green Report*, the staffs have the intention of promoting campus sustainability. Some of the feedbacks are listed below.

- "We have seen a huge change with sustainability buy in among staff too, where it has shifted from 'it's my job' to 'I am happy to do it', to taking steps to educate customers how to do it."

(Richer, 2009, p. 8).

- "It's the environment that we work in that fosters this kind of leadership and commitment, it is what customers want, and it's the right thing to do." (Richer, 2009, p. 7).

- "For so many years sustainability initiatives were coming out of the administration office, now they are decentralized, it shows our employees and collaborators sense of responsibility."

(Richer, 2009, p. 7).

- "When we first started looking at sustainability years ago, we got a lot of critical questions, and a lot of 'us' and 'them', now this has changed, it's a much more inclusive process, culturally within this company sustainability is now a mainstream way of thinking, marking a tremendous cultural shift." (Richer, 2009, p. 7).



We conclude that the UBCFS staffs are willing to participate in the BYOC concept base on the interview and these feedbacks.

### **2.3.2 THE IMPACT ON CUSTOMERS' HEALTH**

Customers' health is always one of the biggest concerns. Disposable containers made with paper or plastic are most commonly used nowadays. However, both of them may lead to food poisoning. As the cost of producing these containers is cheaper than producing reusable ones, most of them have a weaker heat resistance. Therefore, the chemicals used to manufacture them tend to dissolve when the containers are heated. These chemicals are toxic to human bodies. For example, the bleaching chemicals used on their surface may dissolve into the food.

On the other hand, reusable containers have a better heat resistance. Thus, the chemicals used to produce them are less likely to dissolve. Thus, customers have a less chance to get food poisoning when they use reusable containers. Moreover, as people care about their own health, they would make sure their containers are clean before using them. Therefore, the chance for getting food poisoning due to containers' cleanness is reduced to minimum.

### **2.3.3 THE IMPACT ON THE SOCIETY**

#### Increase awareness of living eco-friendly

In order to promote a Waste Free UBC, it is necessary for students and staff to acquire an environmentally sustainable lifestyle. Through introducing the BYOC concept to the campus, it can raise awareness in both students and staff of living eco-friendly. There are many sustainability projects conducting around the UBC campus. Increasing the awareness in both students and staff in sustainability can help promoting the other projects. Thus the BYOC concept is able to assist the development of a waste-free campus. Also, it allows UBC to take leadership in campus sustainability.

### Motivate reduction in paper and plastic usage

One of the reasons for students or staff not used to the BYOC concept is that they are more getting used to using paper or plastic containers. Introducing the BYOC concept allows them to know that there is no big difference in terms of convenience between bringing their own containers and using disposable containers. However, using our own containers in the food outlets can reduce a great amount of paper and plastic containers consumed in the campus. It helps saving our environment.

Based on the analysis above, we conclude that the BYOC concept is partially feasible in terms of social aspect. Students' interest into this concept determines its feasibility as they are the largest group of people who are invited to participate in this concept. As they do not show much interest into it, its feasibility is reduced. However, UBCFS staff are supporting this concept, it brings positive impacts to the society and do not lead to any health problem. Therefore, the feasibility is increased. As it is difficult to measure the amount of change in feasibility scientifically, we conclude that the BYOC concept is partially feasible.

### 3.0 CONCLUSION AND RECOMMENDATION

In terms of economic aspect, we find that the BYOC concept is economically feasible. The program may encounter troubles in the beginning since it may bring inconvenience to customers and cause the food outlet to lose revenue. However, the money we saved on using reusable containers will out run the cost of disposable containers in a long run. Furthermore, the millions of barrels of crude oil saved from manufacturing disposable container may be utilized in other purpose. Therefore, we conclude that the BYOC concept is feasible.

In terms of environmental aspect, we find that the BYOC concept is environmentally feasible by comparing compare disposable containers to reusable containers. Using reusable containers uses less energy and causes less pollution than using disposable ones if number of uses of reusable containers is large enough and the return rate is higher than 99.8%. Furthermore, in terms of social aspect, this concept is partially feasible. This is because students are interested in this concept while UBCFS staffs do show their interest. Also, using reusable containers does not cause any health problem and the concept has a positive impact to the society. Considering that there is only one of the eleven food outlets in the new SUB is going to operate as a BYOC food outlet, the eager of UBC for developing a waste-free campus, and the triple bottom line assessment, we conclude that the BYOC concept is feasible.

In order to encourage students and UBCFS staff to participate in this concept, following recommendations are suggested. To raise students' awareness to this concept, we suggest that UBC should allocate more budgets on advertising this concept to students. Furthermore, selling food at a lower price in the BYOC food outlet can encourage students to bring their own containers to the outlet. Also, we recommend everyone to use glass containers as they course less energy for producing them. Moreover, in order to maintain the return rate of reusable containers, the Eco-To-Go program is a great model to be followed.

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## APPENDIX A – SURVEY RESULTS

A survey was conducted from Nov 12 to Nov 14 and 100 students participated. Three questions were asked and the results are listed below.

- 1) Question: If the new SUB doesn't provide any disposable containers, would you like to bring your own container?

Result: 33 students answered “yes” and 67 students answered “no”.

- 2) Question: If the new SUB provides reusable containers, would you still bring your own container for discount?

Result: 46 students answered “yes” and 54 students answered “no”.

## APPENDIX B – INTERVIEW

A short interview was conducted with a UBCFS staff working in The Loop Cafe in Centre for Interactive Research on Sustainability. Detail is listed below.

Q: Question    A: Answer

Q:     How many customers bring their own containers when they purchase food?

A:     21 to 40%

Q:     Which group of customers bring their own containers more when they purchase food?  
Students or staffs?

A:     They are about the same.

Q:     Does the Eco-To-Go program increase your workload comparing to the time when it had  
not started?

A:     No

Q:     Do you support the Eco-To-Go program?

A:     Yes, I do