

UBC Social Ecological Economic Development Studies (SEEDS) Student Report

**An Investigation into the Feasibility of Bring Your Own Container Program at the New
Student Union Building**

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APSC 261

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An Investigation into the Feasibility of Bring Your Own Container Program at the New Student Union Building

A Triple Bottom Line Assessment

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ABSTRACT

The construction of the new Student Union Building (SUB) at the University of British Columbia (UBC) provides a perfect opportunity to make changes to the existing food container system. UBC strives to reduce solid waste and carbon footprint in order to establish a more sustainable campus. Alma Mater Society (AMS) is proposing their eleven food outlets to implement the Bring Your Own Container (BYOC) concept in the new SUB. The BYOC is a system in which customers are required to bring their own reusable container instead of the store providing disposable take-out containers. The program aims to reduce the solid waste produced by disposable containers. For the investigation, it is assumed that the food outlets will only supply food to customers who bring reusable containers.

A triple bottom line analysis for sustainability is conducted to determine the feasibility of adopting the BYOC program in the new SUB. A survey is created to collect the opinions of students around the campus for the social aspect. The economic and environmental aspect is investigated by studying the similar programs that currently exist in UBC and other universities. The reusable containers have an apparent positive impact on the environment. However, they take more energy to produce, so the reusable containers must be used at least a specific amount of time before it generates a net benefit on the environment. Customers benefit from the BYOC containers economic wise; conversely, food outlets have to subsidize the discount program creating a negative impact on stores. Overall, the economic aspect can be considered as having a neutral effect. The social aspect has a neutral standpoint in the sustainability analysis. Data from the survey suggests that a majority of survey candidates are neutral for willingness to participate in the BYOC program.

It is recommended that food outlets should still provide disposable take-out container, but with a surcharge. This option will not drive the customers away to purchasing elsewhere that supplies disposable containers. In addition, the new SUB should have facilities to accommodate the demands for washing the reusable containers. By taking the recommendations into consideration, it is practical to launch the BYOC program in the new SUB.

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GLOSSARY

Embodied energy – the sum of all the energy required to produce goods or services, considered as if that energy was incorporated or 'embodied' in the product itself.

Hydrostatic pressure – the gravitational force exerted by a fluid in the vicinity onto the object's surface at equilibrium

Polystyrene – one of the most widely used plastics. It is often used in disposable cutlery.

Start-up Costs – All costs that are associated with starting a program.

LIST OF ABBREVIATIONS

AMS – Alma Mater Society

BYO – Bring Your Own (University of Alberta program)

BYOC – Bring Your Own Container

SUB – Student Union Building

U of A – University of Alberta

UBC – University of British Columbia

1.0 INTRODUCTION

In becoming an international leader of sustainability, UBC strives for opportunities to make the campus more sustainable. AMS is attempting to introduce the BYOC food outlets in the new SUB which shares the common prospect with programs such as the AMS Lighter Footprint Strategy and a Waste Free UBC. Customers will need to provide their own containers to purchase food at the BYOC food outlets in this practice. Successful models such as Sprouts have run on the base of the concept. If this front-of-house operation is victorious, AMS will consider apply and promote the concept to a larger scale.

In this report, a triple bottom line assessment of the BYOC food outlet concept is conducted and recommendation of the implementing the concept is drawn to help AMS evaluate the feasibility of the BYOC program. It begins with an environmental impact analysis that evaluates water and energy resources used, material used and life-cycle of different types of reusable and disposal containers based on secondary data. The economic impact analysis focuses on the costs and benefits of reusable and disposal containers from secondary research. The social impact analysis consists of primary and secondary data. The primary data is obtained from a survey conducted on Facebook which gathers UBC students' opinions. The secondary data provides an investigation into several social issues such as hygiene, health and serving complexity associated with customers and staff. Finally, a recommendation is concluded with thorough evaluation that combines the three perspectives.

2.0 ENVIRONMENTAL IMPACT ANALYSIS

Sustainability has always been a main priority for UBC, providing a better environment in campus for students. Therefore, the program proposed by AMS which is the BYOC program, is intentionally to create a more sustainable environment. The idea is to replace the disposable food containers provided throughout UBC with reusable containers where the customers have to bring themselves. However, it has always been a controversial issue on how this replacement action can bring a substantial impact towards the environment on campus. There are several indicators that show how the usage of reusable containers can actually bring benefits towards a more sustainable environment on campus.

2.1 Pollution and Amount of Waste Produced

Based on the data obtained from Statistics Canada: Waste Management Industry Survey,

“In 2008, Canadians produced over 1,031 kilograms of waste per person. Of this total, 777 kg went to landfills or was incinerated while 254 kg was diverted from landfill. Canadians sent approximately 26 million tonnes of waste for disposal to landfills or incinerators in 2008, about the same quantity as in 2006. This followed a 3% increase between 2004 and 2006.”

With the growing number of students at UBC, the usage of disposable containers also increases proportionally. The increase in the amount of waste produced might cause a problem or have negative effects towards the environment in the future. Therefore, with regards to the statistics above, the idea of the BYOC program is introduced in order to adopt the concept of sustainability into this matter in terms of reducing the amount of waste on campus. One major advantage of reusable containers is that they can be used multiple times unlike disposable food containers that are thrown away after being used once.

The disposable containers require resources to produce, transport and dispose of all the materials found in UBC's trash. Using your own reusable mug or food container on campus can save not only money (15 cents per use), but also valuable natural resources.

2.2 Sustainability and Life Cycle

Figure 3-1. The Solid Waste Management Hierarchy

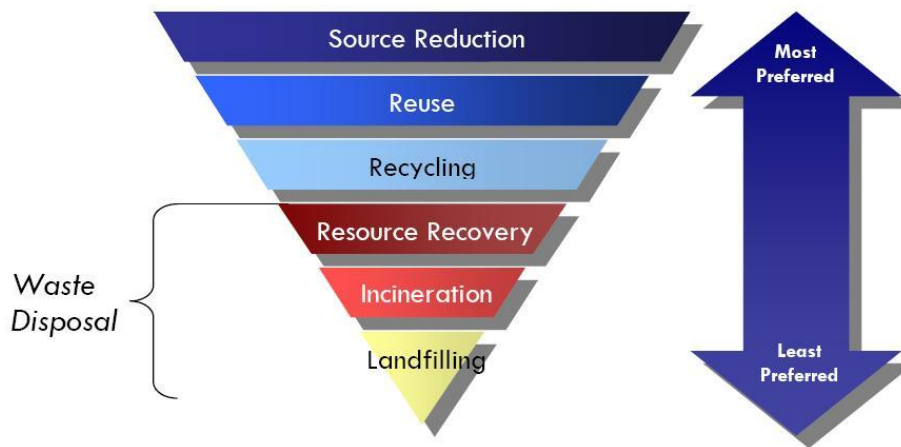


Figure. 1 : Solid Waste Management Hierarchy

<http://www.globaltrashsolutions.com/miami-fl-waste-management-services.html>

The usage of reusable containers helps in establishing a sustainable living environment that has become one of the most important elements on campus. Based on the figure above obtained from Global Trash Solutions website, the idea of reusing has become a more preferable choice after source reduction. Reuse and source reduction are closely related to each other. For example, when we reuse a container, it helps to reduce the amount of source needed to produce the disposable paper containers in terms of cutting trees. "Reuse" has become one of the crucial aspect spotted by UBC that has been taken into action that lead to the BYOC program in order to reduce waste thus enhance the level of sustainability in campus. The life cycle of disposable containers is very short as we can only use them once compared to reusable containers.

Reducing waste is the most important step in waste management. At UBC, there are many initiatives to green the supply chain, reduce paper consumption and promote reusable containers. These programs minimize the volume of materials arriving on campus, and encourage the UBC

community to adopt waste reduction behaviors. Polystyrene and plastic take a very long time to biodegrade. They also make up a large volume of the litter around the UBC campus, and in landfills. According to a 2010 UBC institutional waste audit, the predominant materials that UBC still sends to landfill are organics, paper and plastic. Therefore, it is crucial to reduce the amount of waste in campus to create a better environment.

2.3 Energy and Water Consumption

From the aspect of energy consumption, research was performed by professor of chemistry Martin B. Hocking of University of Victoria. Hocking compared three types of reusable drinking cups (ceramics, glass and reusable plastic) to two types of disposable cups (paper and polystyrene foam). Even though this research was based on the cup, it can also be applied to food containers. The table below shows the amount of energy used to produce a cup from different materials.

Table. 1: Energy required to make typical hot drink cups

| Cup type | Cup Mass | Material Specific Energy | Embodied Energy |
|----------|----------|--------------------------|-----------------|
| | g/cup | MJ/kg | MJ/cup |
| Ceramic | 292 | 48 | 14 |
| Plastic | 59 | 107 | 6.3 |
| Glass | 199 | 28 | 5.5 |
| Paper | 8.3 | 66 | 0.55 |
| Foam | 1.9 | 104 | 0.20 |

<http://www.design4x.com/misc/bus183/handouts/Hocking.SpringerVerlag.Energy%20Use%20of%205%20Different%20Cups.pdf>

Based on the information from the table above, the energy to manufacture reusable cups is larger than energy to manufacture disposable cups. Therefore, a reusable cup has to be used multiple times in order to “cash in” the energy investment in producing the cup and to see the net positive effect on the environment.

In addition, even though there are environmental benefits with biodegradable plates and food containers, there are also drawbacks. The fact that they are disposable means there has been an investment in energy and resources to make an item that is only to be used once. Even if the materials are from a sustainable resource, the energy used in manufacturing, delivering to a store and disposing the waste still needs to be taken into account. It could be argued that a more environmentally friendly option is reusable plates and other containers. While these may not have the flexibility and convenience of disposable items, reusable items can work out to be more cost effective as well as reduce waste.

Figure 2 shows a survey conducted by the Department of Urban Studies and Planning at MIT.

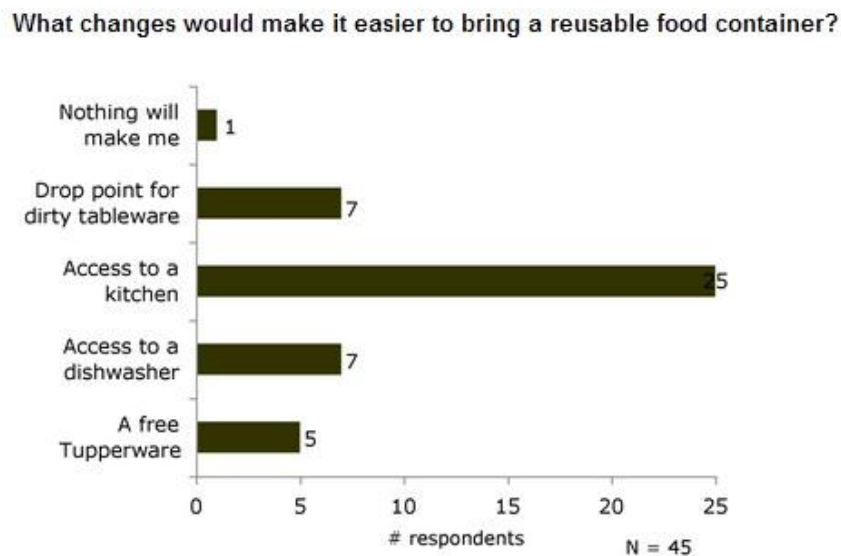


Figure. 2: What changes would make it easier to bring a reusable food container?
<http://web.mit.edu/dusp/green/food/index.htm>

Based on the bar chart above, it shows that the access to a kitchen or washing area can make it easier for students to bring their own containers. Although increasing the usage of water reduces the level of sustainability as more water will need to be provided to wash the reusable containers, it is still more sustainable than disposing large amounts of one-time-use containers. Therefore, the benefits of the BYOC program outweigh the costs, creating a net positive environmental impact.

Finally, below is a table that summarizes the indicators for the BYOC program from the environmental aspect.

Table. 2: Evaluation of environmental indicators

| Indicators | Reusable containers | Disposable containers |
|------------------------------|---------------------|-----------------------|
| Pollution | Low | High |
| Amount of waste produced | Low | High |
| Energy and water consumption | High | Low |
| Sustainability | Yes | No |
| Life cycle | Long | Short |

3.0 ECONOMIC IMPACT ANALYSIS

The implementation of the BYOC food outlet concept in the new SUB means that AMS food outlets need to provide incentives for customers. This section will discuss about the costs associated to launching the BYOC food outlets and compare it with the usage of conventional, disposable containers.

3.1 Cost Associated to Disposable Containers

The expense of using disposable containers can be calculated simply by adding the cost of each container and the disposal fee. AMS is paying \$0.022 for each disposable container handed out. (Chan, Chung, Ergudenler, Pai, Tong, 2010) According to City of Vancouver, the disposal fee rate is \$107.00/tonne. Assuming that each disposable food containers weighs 0.050 kg and each disposable cup weighs 0.025 kg, the cost of disposable for each unit will cost \$0.0054 and \$0.0027 respectively. The total cost for each disposable food container is \$0.027 and cup is \$0.025.

3.2 Cost Associated with Bringing Reusable Container

3.2.1 Cost Savings for Customers

The BYOC food outlet concept can provide cost savings to the customers. Currently, UBC Food Service and AMS Food and Beverage stores provide discounts of \$0.15 to \$0.25 as an incentive for customers who choose to provide their own reusable containers. University of Alberta (U of A) runs a similar program called Bring Your Own (BYO) Container. U of A also offers savings for customers who bring their own container. Table 1 below is a summary of the savings from the University of Alberta Office of Sustainability website.

Table. 1 : Summary table of discounts from University of Alberta

| Location | Discount | Beverage | Food |
|-------------------|-----------------|-----------------|-------------|
| Bar Teca | \$0.40 | x | |
| Cram Dunk | \$0.25 | x | |
| Edo Japan | \$0.25 | | X |
| Macro's Famous | \$0.25 | x | X |
| Subway | \$0.25 | x | X |
| Cookies By George | \$0.20 | x | |
| L'Express | \$0.20 | | X |
| Taco Time | \$0.20 | | X |
| Juicy | \$0.10 | x | X |
| Java Jive | \$0.05 | x | |
| Tim Hortons | \$0.05 | x | |
| Average | \$0.19 | x | |
| | \$0.21 | | x |

Data Retrieved from University of Alberta Office of Sustainability

<http://www.sustainability.ualberta.ca/~media/sustainability/AboutUs/Green%20Guide/Documents/Food.pdf#nameddest=sustainablefoodpractices>

The average price of discount for reusable cups and food containers in the BYO container program is \$0.19 and \$0.21 respectively. Therefore, it is practical economic wise for AMS food outlets to continue offering the \$0.15 to \$0.25 discount.

In the store's perspective, the money spent on single-use container can be allocated to fund the discount plan. In the previous section, it is estimated that the disposable food containers costs \$0.027 each and disposable cups costs \$0.025 each. The problem with the savings program is that the AMS needs to subsidize approximately \$0.12 to \$0.23 for each reusable container. The money can be raised through sustainability funds.

3.2.2 Cost of Implementing the Program

In order to implement the BYOC program, there are start-up costs that need to be taken into consideration such as promotion and equipment fees. AMS needs to spend money on posters and flyers to inform people of the BYOC program. Sinks need to be built to accommodate the demand for cleaning the reusable containers.

3.2.3 Potential Reduction in Stores Revenue

It is important to note that according to our survey, the BYOC will affect the customer's preference of the place to eat. According to the survey we performed, 66% of the people say that the BYOC will affect their choice of food. However, 31.25% of the people say that they will participate in the BYOC program while a majority, 62.50% say that they are neutral about the idea. The total effect on the customer's willingness to purchase from the BYOC food outlets can be further studied by surveying a greater number of people to get a more accurate representation. But based on our survey results, AMS food outlets will definitely see a decrease in revenues if the BYOC program is put into action.

3.3 Comparison of Disposable and Reusable Container Cost

The food and beverage container system currently in place only requires the stores to purchase the inexpensive disposable containers and pay for the low-cost disposable fees. The BYOC program would require the AMS food outlets to spend money on promoting, operating and subsidizing discounts. The increased consumption of water (to wash the containers) will create extra costs on the system. Conversely, it is beneficial for the customer since they can save money by bringing their own container.

Based on our data, it is not sustainable economic wise for the stores but is for the customers to adopt the BYOC concept. The low-priced disposable containers and disposal fee is appealing to the profit-maximizing stores, since using the conventional take-out containers would generate a higher economic output for the food outlets. Thus, there is a disincentive for the stores to support the BYOC program. The AMS food outlets would be interested in the program if the cost of single-use containers or disposal fee inflates significantly, such that the savings covers the costs, generating a net surplus.

It is not necessarily a bad idea to make an early investment into the food and beverage container system. The net economic sustainable is neutral because customers benefit and stores suffer.

4.0 SOCIAL IMPACT ANALYSIS

In order to make our social analysis more realistic, we combined both primary and secondary research methods. The following section presents the results and inferences of the primary and secondary research. For the primary research, we conducted a survey on Facebook that collects the information of students' opinion. The size of the sample is 53. Although the size of sample is relatively small, it is still an insightful source that we could obtain under the constraints of time, resources and assistance. The secondary research examines indicators such as hygiene, health and serving complexity.

4.1 Survey

Our primary data comes from the survey hosted on Facebook. We decided to hold the survey on Facebook because of simplicity and accessibility. The survey consists of seven multiple choice questions on the BYOC Program. Only the five most relevant results of the survey are taken and analyzed in the subsequent section.

4.1.1 Awareness of the BYOC Concept

The first question we asked on the survey is whether the UBC students have heard of the BYOC program before and Figure 4 shows the result we obtained.

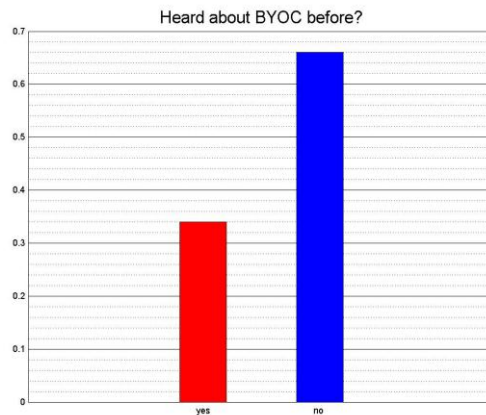


Figure. 3: Awareness of the BYOC Concept

The result shows 66% of the surveyed UBC students have not heard of the program before. This survey will increase the sustainability of awareness to the public and invite students and staffs to share their opinion or sustainable tips.

4.1.2 Likeness of the BYOC Concept

Figure 5 shows the investigation of whether the surveyed UBC students like the BYOC concept after we have introduced to them what the BYOC concept is about and how it can benefit the environment and the economy.

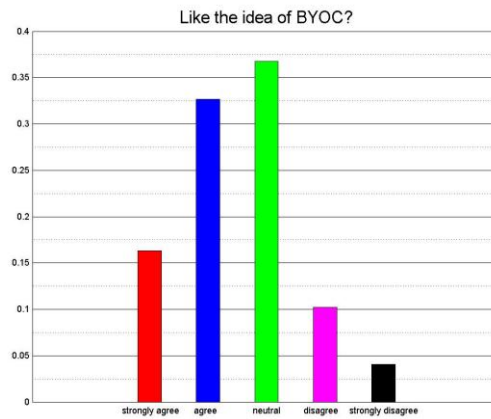


Figure. 4: Likeness of the BYOC Concept

The majority of the students like the BYOC concept. The result shows that 86% of the surveyed UBC students do not disagree with the concept. We have investigated the reasoning of those who disagree. The two main reasons are: time spent on UBC campus and frequency of purchasing food from outlet. They do not like to carry multiple containers with them or to wash containers because they usually spend more than two meals on UBC campus or only purchase food on rare occasions.

4.1.3 Willingness of Participation in the BYOC Program

Figure 6 shows the surveyed students' willingness to participate in the BYOC program.

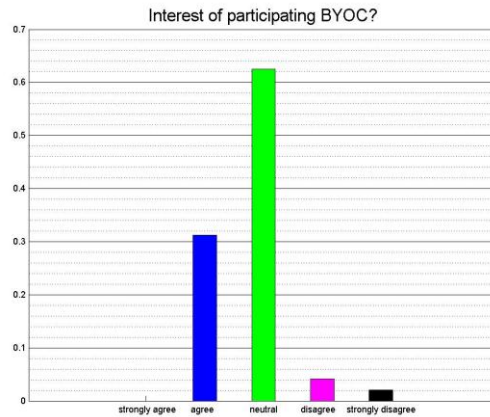


Figure. 5: Willingness of Participation in the BYOC Program

We expected the results to be similar to the likeness of the BYOC concept; however, the results were quite different. Many students shifted their opinion from extreme to neutral. There were 16% of the surveyed UBC students strongly agreed with the BYOC concept but 0% indicates that they will strongly participate in the program. On the other hand, 14% of the students who disagreed with the concept have decreased to 6%.

We discovered that many students shifted their opinion from extreme to neutral or from others to neutral because if the BYOC program is mandatory, they indicate that they will participate since it is mandatory, however, if the BYOC program is optional, they will most likely to act the way they were depending on what is more convenient and suitable.

4.1.4 Residence

We have also considered a factor that may affect the students' decision: residence. Figure 7 illustrate the number of students who reside on UBC campus.

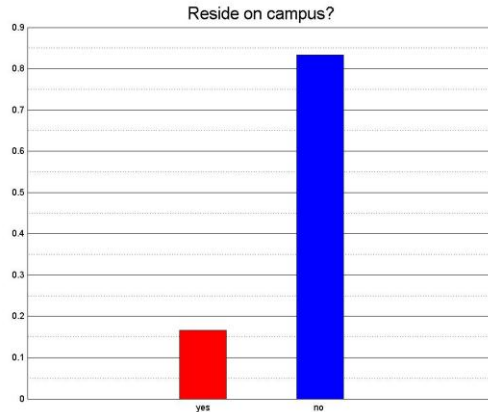


Figure. 6: Residence

17% of the surveyed UBC students live on or near UBC campus while 83% of the surveyed students do not. We found that students who live alone on or near campus or in dorm tend to buy food at food outlets more often than students who live with friends or family on or near campus. Those students living with friends or family on campus suggest that they buy less food because their friends or family usually prepare meals for them, and they feel guilty if they do not finish the prepared meals. However, the same logic does not apply to those who live far away from UBC campus. Many students buy food frequently despite whether they live with friends or family. Some of them suggested that they buy food frequently because they spend too much time on UBC campus and the food they prepared are not enough despite that their friends or family at home have already cooked food for them. However, some will still go home and enjoy the meals with their friends or family even if they will be suffering from hunger until they arrive home.

4.1.5 Effects of the BYOC Program on Choice of Food

The most important question we asked the surveyed UBC students is that whether the BYOC program will affect their choice of food. This question will determine whether the BYOC will be successful because the goal of the program is to reduce the disposal containers used in food outlets while maintaining the business. Figure 8 shows the effects of the BYOC program when buying food.

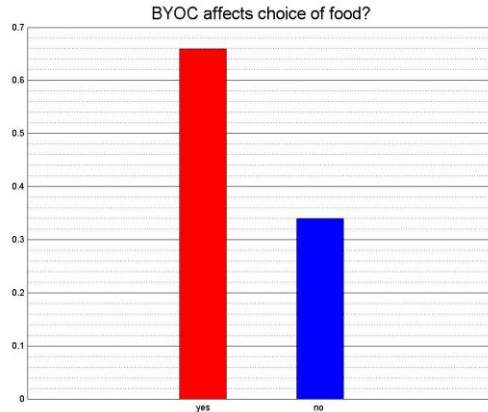


Figure. 7: Effects of the BYOC Program on Choice of Food

The result suggests that 66% of the surveyed UBC students will reconsider their choice if the BYOC program is enforced. We have investigated some students who will change their decision on food if the BYOC program is adopted. Some of them implied that if they need to bring their own containers, they would also prepare their meals. On the other hand, some of them implied that they would simply buy food elsewhere and bring them to UBC campus or reduce their frequency in buying food. We discovered that many students would decrease the food demand on food outlets on UBC campus if the BYOC program is mandatory and restaurants would not serve food to those who do not have their own containers.

4.1.6 Inference from the Survey

After evaluating students' opinions, we suggest AMS to adopt the BYOC program in the new SUB. However, we do not strongly encourage AMS to penalize customers who do not bring their own containers by not selling food to them; instead, charging them extra money to teach them to bring their own containers. By doing this, AMS would be able to keep the same amount of customers since most of the students think the BYOC program is acceptable and do not oppose to participate if it is mandatory.

4.2 Hygiene

One main hygienic concern is the risk of food safety which arises from the leftover remained in the container for extended time and under improper temperature as contaminants start to grow (Hudson, 2009). Leftovers include the foods remained because ones could not finish all of them and foods adhered on the surfaces of the container. The microbial population can grow substantially fast under a wide range of the moisture and temperature and the condition of such a container with food is extremely suitable for the growth of contaminants if not cleaned immediately. As there might be a lack of facility around where ones have their meal, they might choose not to clean their container soon after finishing the meal and leave it until they return home.

Another hygienic issue is inadequate cleaning. Hudson points out inadequate cleaning could increase the risks of food safety as the containers may become a suitable habitat for bacterial contaminants (Hudson, 2009). Cleaning methods include wiping with a damp cloth, wiping with dishwashing spray, washing in dishwasher and hand washing. Considering the constraint at school, the most convenient and accessible way is wiping with a damp paper towel and hand washing. Either way requires a sink facility and perhaps supplying dish detergents. Therefore, installation of sink areas around food outlets needs to be taken into account to accommodate the need of cleaning after meal to maintain student's well-being (Stetson University Environmental Responsibility Council, 2000).

The two factors can happen simultaneously, meaning inadequately cleaning a container that contains food debris for a long period of time. The container could then accumulate bacteria and contaminate the subsequent foods and thus creates potential severe food safety risks.

4.3 Health

Since the program requires the public to bring their own container, an examination focusing on the health comparison of the current disposable container and the most common types of reusable containers is necessary to be carried out. Two candidates of reusable containers, plastic and glass containers are chosen to be discussed for their possible health effect. Plastic containers

are light, mostly less than fifty grams, and unbreakable but more reported to be harmful to health, whereas glass containers possess many contrary characteristics and in average weigh for around half a kilogram. Although metal containers are also common, they are excluded for their lack of microwaveability and thermal insulation.

4.3.1 Disposable Containers

The types of disposal containers used for restaurant take-out in UBC campus are coated paperboard and polystyrene containers. They provide restaurants with take-out services and customers with convenience. However, they not only provide convenience to us but also contribute to health issues.

Styrene is a toxic chemical product that is used widely in our everyday life, especially disposal containers (Weil, 2012). Styrene, in short term, can disrupt normal hormone functions and causes thyroid issues, menstrual irregularities, breast cancer and prostate cancers if the amount of styrene is over consumed (United States Environmental Protection Agency, 1994). Hence by shifting the containers to reusable ones, the health danger can be alleviated.

4.3.2 Plastic Reusable Containers

Citing from Healthy Child Healthy World, a recent report with more than sixty scientists' contribution shows that the "chemicals added to plastics are absorbed by human bodies. Some of these compounds have been found to alter hormones or have other potential human health effects" (Healthy Child Healthy World, 2012). Depending on the type of plastic, the characteristics such as heat resistance, durability and chemical leach vary. According to Tomás Bosque, plastics number 2, 4 and 5 are less prone to chemical leach, but they retain odors and stains and they also leak after multiple uses so they are not good long term choices (Tomás Bosque, 2010). Therefore, AMS shall also encourage students to choose another material for their container.

4.3.3 Glass Reusable Containers

Glass containers become more and more durable and unbreakable as glass technology advances. The technology in production of glass is substantially mature. A study of glass characteristics in 1922 already shows glass can withstand “end crushing pressure of from 8000 to 12000 pounds, a transverse pressure of from 800 to 1800 pounds, a hydrostatic pressure of from 400 to 1600 pounds, and an impact of a fifty-pound hammer falling from 2 to 6 feet” (Bitting, 1922).

4.4 Serving Complexity

Since the containers are not standardized, there may be variation in both size and material of the container, thus, increasing the serving complexity. The servers will have to cope with these variables. Different sizes of containers might affect the server’s subjective feeling of the serving size. Customers paying the same price may receive different amount of food because the size of their container prohibits the servers from equally distributing the food. There are also chances that customers bring containers that are too small to hold the food. In these cases, the fairness of serving size is challenged and might need to alter the way of pricing. One suggestion is to charge the food by weight instead of by serving size. The second problem arises from the material of the container. If customers come with a poorly thermal insulating container, for example metal, both customer and servers are under the threat of being burned or scorched if the food is hot. This elevates the serving danger and might cause medical fee disputation for extreme cases. Thus, advocacy of bring thermal insulating lunch boxes to the public is also important.

5.0 CONCLUSION AND RECOMMENDATION

We have conducted a triple bottom line assessment on the BYOC program. From the environmental point of view, the results show that the idea of replacing disposable food containers with reusable containers can provide a net positive environmental impact. The amount of resources such as paper and plastic that are used to produce disposable containers can be reduced substantially. Moreover, even though the energy used to produce a reusable container is higher than a disposable container, by using the reusable containers multiple times, the average energy consumption is in fact less. The reduced amount of solid waste can generate a net environmental benefit.

In addition, evaluation of the program from the economic aspect is neutral. Customers can benefit from the program by bringing their own containers to receive discounts. In contrast, the food outlets may lose some amount of their revenue as they have to subsidize the discount program and suffer partial decrease in revenues due to loss of customers. Therefore, the program suggests a neutral economic effect since the customers benefit and stores suffers.

Based on the survey that we have conducted, the data shows that most of the participants are neutral in their willingness to take part in the BYOC program. Some students fully support the concept as the program can reduce harms to the environment while some disagree. This might be due to several issues such as hygiene and convenience.

We recommend that food outlets should still supply disposable containers, but at an extra cost. Customers that do not want to bring reusable containers can still purchase from BYOC food outlets. By having a disposable container option, the stores will not lose these customers. We also suggest that the new SUB should have sufficient sinks for the customers to clean their reusable containers. Lastly, the food should be charged based on the weight so that it eliminates the complications with serving size. We conclude that by taking our recommendations into consideration, it is feasible for AMS to adopt the Bring Your Own Container food outlet concept.

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