

A Mug-Share Program at Dalhousie University

ENVS 3502 *Campus as a Living Laboratory*



Figure 1. "Borrow A Mug." Mug Share Program Dalhousie.

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1. Executive Summary

Single-use cups represent a large quantity of needless waste produced on the Dalhousie Campus. This research project focuses on single-use cups waste minimization initiatives on the Dalhousie's Studley Campus. In particular, it explored the potential benefits and barriers associated with the Mug-Share program comparable to that of which was spearheaded by the University of Northern British Columbia. The objective of this study is to further Dalhousie University's solid waste diversion initiatives and contribute to overall institutional sustainability.

The study was designed to gauge the interest of students, staff and faculty at Dalhousie University in a Mug-Share program. The study carried out a thorough literature review, which provided a comprehensive analysis of single-use cups and their implications for the environment and waste management in the province of Nova Scotia and institutions of higher education. Further, it instrumented a survey/questionnaire and employed non-probabilistic consecutive sampling. The scope of the research was limited to the Studley campus and in particular, the beverage retail locations in the Student Union Building and Killam Library.

It was discovered that 94% of research participants consume between 1 and 9+ single-use cups on a weekly basis, 40% of which improperly dispose their single-use cup. Eighty-two percent of research participants believe that single-use cups are an unnecessary source of waste. The majority of participants felt that reducing waste was the largest incentive to participate in the program. The largest concern was cleanliness. Eighty-eight percent of participants said they would participate in the program if it were implemented on the Studley Campus. While these results cannot be generalized for the entire Dalhousie community, they are a strong indication that the Mug-Share program would be successful in engaging students, staff and faculty and would be effective in minimizing waste generated by single use cups.

2. Project Definition

According to lead researchers in waste minimization in institutions of higher education, "comprehensive solid waste management programs are one of the *greatest challenges* in achieving institutional sustainability" (Smyth et al., 2010, p.1). As of 2014, Dalhousie University has achieved their objective of 55% waste diversion as outlined in the University Sustainability Plan and is currently diverting approximately 60% of its waste (Dalhousie Office of Sustainability, 2014). To build on this momentum, Dalhousie University has committed itself to a waste diversion rate of 75% (Dalhousie Office of Sustainability, 2014). In order to realize these targets, Dalhousie University has outlined a comprehensive solid waste management plan (Dalhousie Office of Sustainability, 2015) that employs "a holistic management approach to improving waste minimization and diversion efforts" (Davidson, 2011, p.3).

Decisions regarding waste management should be informed by the concept of waste hierarchy, which posits that the most effective way to manage waste is to reduce it at its source (Harris et al., 2009; Davidson, G., 2011). A 2004 study on waste associated with single-use cups

at Dalhousie found that approximately 57 280 single-use cups were discarded on the Studley campus per month. This comprised 9% of total waste produced on the Studley Campus (Alsop et al., 2004). This degree of needless waste is inadvisable for an institution that has committed itself to achieving campus sustainability. The waste generated by single-use cups has been identified as a prominent issue in other institutions of higher education as has led to waste minimization efforts through the promotion of reusable cups (Harris et al., 2009; Mason et al., 2003; Smyth et al., 2010; Tchobanoglous et al., 2006). For example, the University of Northern British Columbia has run a successful program for three years that provides consumers with reusable mugs that they can use on campus and offers a financial incentive to any person participating the program. This program, formally known at Borrow-a-Mug, has successfully engaged students, staff and faculty and has significantly contributed to waste minimization on campus (Munoz, 2012). While research specific to Dalhousie University has focused on waste generated by single-use cups and potential for financial incentives to encourage the use of reusable cups (Alsop, et al., 2004; Fairbarin et al., 2008) it has yet to explore whether a program such as Borrow-a-Mug could be successfully employed. The purpose of this study was to gauge the interest of student, staff and faculty in a program similar to Borrow-a-Mug. The research was guided by the following research question:

What are the benefits and barriers identified by students, staff and faculty in a Mug-Share program on Studley campus?

In exploring the benefits and barriers associated with a Mug-Share program, as identified by students, staff and faculty, the researchers intended to gain a comprehensive understanding of the practical implications of the program.

3. Background and Rationale

3.1 Environmental Impacts of Single-Use Cups

Single-use cups consist of paper lined in an insulating wax or plastic lining. The lining prevents the paper from effectively breaking down therefore single-use cups are neither recyclable nor compostable in the Halifax Regional Municipality among other regions around the world (Martin, 2006). As a result, single-use cups are sent to the landfill upon disposal ending their linear lifecycle (Martin, 2006). Many consumers are unaware of how to properly dispose of single-use cups and discard them into the compost and recycling streams. When a single-use cup is placed in the improper disposal receptacle it contaminates the contents of the bin thus redirecting the affected composted and recycled materials to the landfill (Davidson, 2011b).

The litter of single-use cups is a prominent issue in Nova Scotia. According to a 2004 province wide litter survey, single-use cups constituted 15% of total litter collected (Allen et al., 2004) A 2008 survey found that the quick service industry made up 30% of litter collected of which 82% consisted of disposable cups, utensils and straws (Oakley, et al., 2008).

Although the waste associated with one single-use cup is seemingly small on its own, when looking at global consumption patterns the waste is unfathomable. Globally, 500 billion single-use cups are sent to the landfill each year (Woods & Bakshi, 2014). In order to minimize the excessive and unnecessary waste generated by single-use cups, many institutions, businesses and individual consumers have looked to reusable ceramic mugs as an alternative (Harris & Probert, 2009; Mason et al., 2003; Smyth et al., 2010; Tchobanoglous et al., 2006; Woods & Bakshi, 2014; Ziada, 2009). In order to fully comprehend the environmental impact of a single-use cup, one must analyze its impact in each stage of its life cycle: from acquisition of raw material to production, use and disposal (Häkkinen & Vares, 2010).

There are multiple academic studies that have explored the life-cycle analysis of single-use cup versus reusable mugs. These studies have come to varying conclusions however there is general consensus that ceramic, glass and various plastic reusable cups are superior to single-use cups after a break-even point (Woods & Bakshi, 2014; Ziada, 2009). The break-even point for ceramic mugs is 31 uses, which signifies that after 31 uses, the ceramic mugs are more environmentally sound than a single-use cup (Carbon Clear, 2012).

3.2 Waste Management in the Province of Nova Scotia

Nova Scotia's Solid Waste Management Strategy was introduced in 1995 to address public concerns surrounding landfills and the incineration of waste (Dalhousie University Office of Sustainability, 2015). That year, the province of Nova Scotia passed the Environment Act (1995) that contained a solid waste diversion target of 50% by the year 2000. In order to meet these targets, the government put in place many programs including the Resource Recovery Fund Board, the ban of organic and recyclable material from the waste stream, the introduction on enviro-depots and centralized composting (Davidson, 2011a; Dalhousie Office of Sustainability, 2015). After this target was achieved, the provincial government legislated a new and ambitious target of a per capita waste disposal rate of 300kg by 2015 as part of the Environment Act (2006) (Davidson, 2011b). A revised plan was released in 2011, which outlines the provinces commitments to a regulatory process to ensure waste diversion objectives are achieved (Dalhousie University Office of Sustainability, 2015).

3.3 Waste Management at Dalhousie University

As an institution committed to sustainability, waste management is a critical area for action in realizing the broader goals of minimizing the universities environmental burden through waste reduction and diversion. In 2010, Dalhousie introduced the Sustainability Plan, which outlined their strategic directions for achieving sustainability outcomes (Dalhousie University Office of Sustainability, 2014). The plan included a target of a 55% waste diversion by 2014. The university was successful in meeting this target and is currently diverting approximately 60% of waste from the landfill. As part of the four-year progress report, Dalhousie identified a new target of 75% diversion rate, which will be achieved through the University Waste Management Plan (Dalhousie University Office of Sustainability, 2014). Dalhousie's Waste Management is informed by the principle of waste hierarchy, which identifies

the waste reduction at the top of the hierarchy-followed suit by Reduce Reuse and Recycle (Dalhousie Office of Sustainability, 2015). Waste reduction, or waste minimization entails a reduction of waste by its generation source by redesigning products or changing consumer and societal behavior (Davidson, 2011). In efforts to reduce waste, the Waste Management Plan identified education opportunities for staff and students, providing key commodities to students and staff to reduce waste and the purchasing of items that can be easily reused or recycled (Dalhousie University Office of Sustainability, 2015).

3.4 Single-Use Cup Waste at Dalhousie University

Single-use cups account for a large percent of needless waste produced on the Dalhousie Campus (Alsop et al., 2004; Fairbarin et al., 2008). This has been the focus of several studies carried out by students in the ENVS 3502 Problem Solving course. A study carried out by in 2004 found that approximately 57 260 single-use cups were discarded per month on the Studley campus, which represents 9% of total waste represented 9% of total waste generated. The study found that 94% of students surveyed considered single-use mugs unnecessary waste on campus. Further, 60% of students surveyed own a reusable mug, 45% of which rarely use it. The main incentive for using reusable cups is environmental and for those who don't own a mug, the main barrier is inconvenience (Alsop et al., 2004). In 2008, a similar study found that that the 10-cent incentive to bring a reusable mug was ineffective. The largest barriers to using a reusable mug is forgetting to bring it and keeping it clean and for those who do not own a mug, it is an issue of inconvenience (Fairbarin et al., 2008).

Beyond the generation of waste, a 2008 waste audit carried out at Dalhousie found that single-use cups were a significant source of contamination in all waste streams due to improper disposal (Davidson, 2011a). Although the approximate waste generated by single-use cups at Dalhousie is unclear, it is evident that single-use cups constitute a significant portion of total waste generated by the University. In order to reduce unnecessary waste associated with single use cups, Dalhousie should expand its reach beyond financial incentives at Dalhousie Food Services retail locations and gratuitous coffee (AASHE, 2015, January 7).

3.5 Minimization of Single-use cup waste in Institutions of Higher Education

Many institutions of higher education have carried out waste reduction initiatives focused on single-use cups through the promotion of refillable cups (Harris et al., 2009; Mason et al., 2003; Smyth et al., 2010; Tchobanoglous et al., 2006). Central to successful refillable mug campaigns is a variety of policy and education measures aimed at challenging wasteful consumer behavior (Smyth et al., 2010). A study carried out at Welsh University, focused on the viability of reducing single-use cup waste through a "Lug-a-Mug" program found that there was a positive response amongst students, staff and faculty. Welsh University sends approximately 20 000 disposable paper and plastic cups to the landfill on a weekly basis. The study found that increasing convenience and ease of participation, direct financial incentives, education of the problem, illustration of results from the initiative and the creation of social norms are necessary components to effective refillable mug programs (Harris & Probert, 2009). Massey University of

New Zealand has successfully implemented a “Lug-a-Mug” program in their student cafeteria as key action area to further their goal to be a zero waste university (Mason et al., 2003).

The University of California introduced reusable dishware including cups, plates and utensils to a festive they hold annually in an effort to minimize waste. The result was a reduction of the per capita waste generation rate of 0.22 to 1.19k per day (Tchobanoglous et al., 2006). A waste characterization study carried out in the University of Northern British Columbia found that the university sent 5000 single-use cups to the landfill each week. In response to these findings, the student organizers recovered single-use cups from the waste stream, assembled them and strung them from the ceiling of the main corridors in the university advertising the findings of the study. According to student, faculty and staff, the visual display was effective in bringing the issue to light. It was then suggested that the university standardize a 20-cent incentive for using a reusable mug and purchase reusable mugs to make them available to students (Smyth et al., 2010). The Borrow-a-Mug program was introduced to the university in 2012 as a student-led movement to minimize waste generation from single-use cups. The program offered student, staff and faculty reusable mugs that were available in stations throughout campus where drinks were sold. After their use, the mugs were collected and cleaned by student organizers and returned to their stations. Any person who participated in the program also received a financial incentive of 10-cents. The program running successfully to this date and considerable change and consumer behavior has been noticed (Munoz, 2012).

3.6 Implications of Literature Review

Given Dalhousie University’s earnest commitments to waste diversion and overall institutional sustainability, it is the researchers belief that this study is both timely and valuable. The Mug-Share program presents an important opportunity for Dalhousie to further its waste minimization efforts. Drawing from the success of UNBC’s Borrow-a-Mug program and the outcome of this study, Dalhousie can tailor the Mug-Share program to be appropriate for their context.

4.0 Research Methods

The philosophical underpinning of this study can be identified as transformative. The transformative paradigm implies that research inquiry must be grounded in the desire to generate positive change. The research followed an exploratory research objective as it aimed to develop a thorough understanding of a problem that has not yet been clearly defined and potential solutions to that problem.

This study carried out a literature review and surveys to gain a comprehensive understanding of the implications associated with a Mug-Share program. The literature review

provided a strong foundational knowledge of the environmental impacts of single-use cups, waste management policies in the province of Nova Scotia and Dalhousie University, previous research conducted at Dalhousie focused on single-use cup waste and waste minimization efforts targeting single-use cups in institutions of higher education. The key research tool of this study was the survey, which was distributed using a non-probabilistic consecutive sampling method. The surveys were administered to students, staff and faculty in locations where beverages are sold including Petes to Go, Tim Hortons and Second Cup on the Studley Campus. The surveys were administered at random through interception to students, staff and faculty in line for beverages. These locations were selected because they are highly frequented by students, staff and faculty. The surveys allowed the researchers to gauge students, staff and faculty's interest and willingness to participate in the Mug-Share Program.

A survey was selected as the research tool for several key reasons. The survey provided guaranteed anonymity for research participants. The survey also allows for high data collection turnover rate that permitted the researchers to reach a relatively large sample despite time constraints. While an interview or focus group would also guarantee anonymity and allow for richness and depth of data, the primary concern was having a large enough sample size to justify statistical analysis, which could not be achieved with interviews or focus group due to time constraints. The research population was sampled with carefully tailored and purposeful questions to ensure reliability and validity in the study.

4.1 Survey Design

The survey was anonymous and comprised of eight questions that addressed habits of single-use cup consumption, knowledge of cup disposal and the incentives and disincentives associated with the Mug-Share program. Several of these questions were informed by previous research carried out at Dalhousie that focused on the minimization of single use cup waste. The survey provided a succinct explanation of the Borrow-a-Mug program in order to contextualize the study. The questions followed a closed structure and open structure format and included single response, categorical and ranking.

4.2 Sample Population

The sample population size was 400 and was comprised of students, staff and faculty of Dalhousie University. As previously stated, this study targeted individuals who were in line for beverages at the Second Cup, Petes to Go and Tim Hortons. Due to the nature of non-probabilistic sampling, the results of the study could not be generalized for the entire Dalhousie population. That being said, 400 surveys provided a sufficient amount of data to gain a strong understanding of emerging trends in data regarding consumption and disposal habits and foreseen benefits and barriers the Borrow-a-Mug program.

4.3 Data Analysis

The surveys were compiled after data collection was complete. The questions were analyzed following a categorical, nominal and ordinal scheme. Microsoft Excel was used to

display the results of each question. Each answer was assigned a numerical value for data analysis purposes; this allowed the data to be entered into Excel where it could be further analyzed using functions including mean and median. Mean and median are measures of central tendency, which were selected to evaluate data results from each question and generate knowledge regarding what the most popular answers were among the respondents. The results of each question were calculated within excel which provided the exact percentages and numbers needed to create the graphs and charts.

4.4 Limitations and Delimitations

There were two principal limitations in this study concerning time and representation. The researchers experienced time constraints throughout the data collection. Due to the fact that this study employed non-probabilistic consecutive sampling, the data cannot be generalized to represent the Dalhousie population. It was the intention of the researchers to broaden the scope of the research to include health and safety implications, costs associated with the programs implementation and the willingness to retailers to support the program. It was equally their intention to increase the sample size and to broaden the target locations to include multiple locations where beverages are sold on the Studley campus. However, the researchers realized these research objectives were overly ambitious given the short period for data collection and therefore had to impose delimitations on the scope of the research.

4.5 Reliability, Validity and Trustworthiness

Reliability was generated in the study by ensuring data collection was conducted using a stable routine. The researchers surveyed at the same time during both data collection periods, and worked collectively to ensure consistency within the results. The results obtained from survey respondents cannot be applied to the Dalhousie population as a whole due to the method through which they were collected. This generates a lack of validity in the research, as the collected data does not represent the entire phenomenon being studied. To ensure that respondents trusted the survey they were completing, a brief explanation was given regarding the Mug-Share program and what their role was in the study. In addition the researchers were available for any discussion or questions from the participants.

4.6 Procedure

The data collection took place in a two-week time frame with two different data collection periods. Each period consisted of three hours. After finalizing the survey, the researchers piloted the survey to ten Dalhousie student to ensure that the survey was comprehensible, straightforward and engaging. The outcomes of the pilot survey were positive and indicated that the researchers were prepared to formally distribute the surveys. The Environmental Science Department of Dalhousie printed 400 hard copies of the survey. Each of the four researchers received approximately 100 copies of the survey.

The first period of data collection was carried out by three researchers and took place in three locations. As previously stated, the research took place over three hours. The first hours of the research period took place in the Student Union Building at Tim Horton. All three

researchers administered surveys at Tim Hortons due to the larger volume of people in line. After the an hour, two of the three researcher relocated to Petes to Go in the Student Union Building and Second Cup in the Killam Library. Therefore for the remaining two hours of the research period, each researcher continued data collection at one of three target locations. The surveys were administered to individuals in line for their beverages at both locations. Each individual in line was asked to participate in the survey. An explanation of the survey, its purpose and a succinct description of the Barrow-a-Mug program were offered to each individual before asking for their participation. Upon completion, a researcher would collect the survey, offer the participant a cookie and then place the survey in a large opaque box. At the end of the first data collection period approximately 200 surveys were collected.

Approximately a week and a half after the first data collection period, three researchers assembled to continue data collection. The same processes took place in the second data collection period, which was carried out over three hours. After the three-hour period, all 400 surveys had been completed.

A thorough literature review was conducted prior to carrying out the study to ensure that the study was grounded empirical research. The areas of the literature review include the environmental impact of single-use cups, waste management in the province of Nova Scotia and in Dalhousie University, single-use cup waste at Dalhousie University and minimization of single-use cup waste in institutions of higher education. The data collected from the surveys supported the research findings in the literature review, strengthening the understanding of single-use cup waste on Dalhousie campus.

5.0 Results

5.1 Survey Question #1

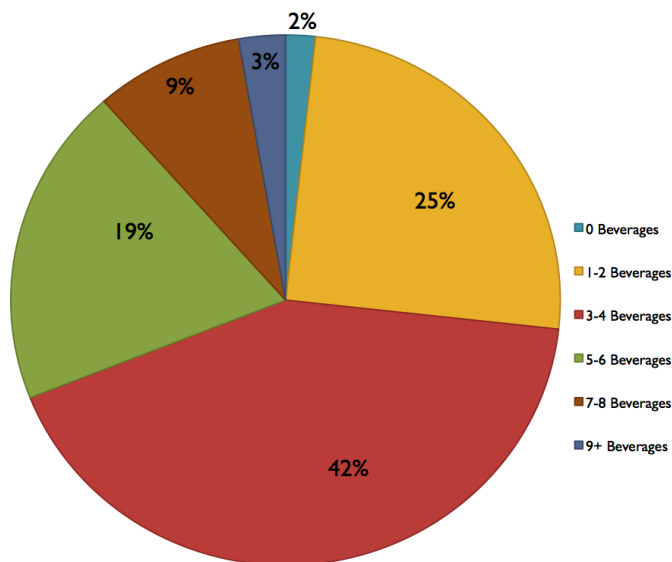


Figure 1 displays results from question one of the survey: on average, how many hot beverages do you purchase on campus each week?

This data indicates the average number of hot beverages purchased by survey participants on Dalhousie Studley Campus each week. The mode response was 3-4 hot beverages consumed on average each week which represented 42% of survey participants. Taking into account this data in contrast with the data from question two of the survey, which addressed single-use cup consumption, one can draw conclusions as to the approximate consumption of single-use cups.

5.2 Survey Question #2

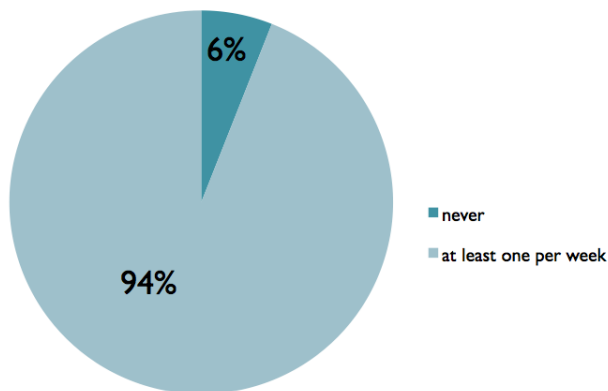


Figure 2 displays the results from question two of the survey: on average, of your total hot beverage beverages, how many were using a single-use cup?

This data indicates that 94% of participants who purchased a hot beverage on campus at least once a week, additionally consumed a single-use cup at least once a week. Although it is not depicted in this figure, once a week represents consumption between one and nine plus single-use cups per week. Six percent of respondents consistently use an alternative to single-use cups when consuming their beverage.

5.3 Survey Question #3

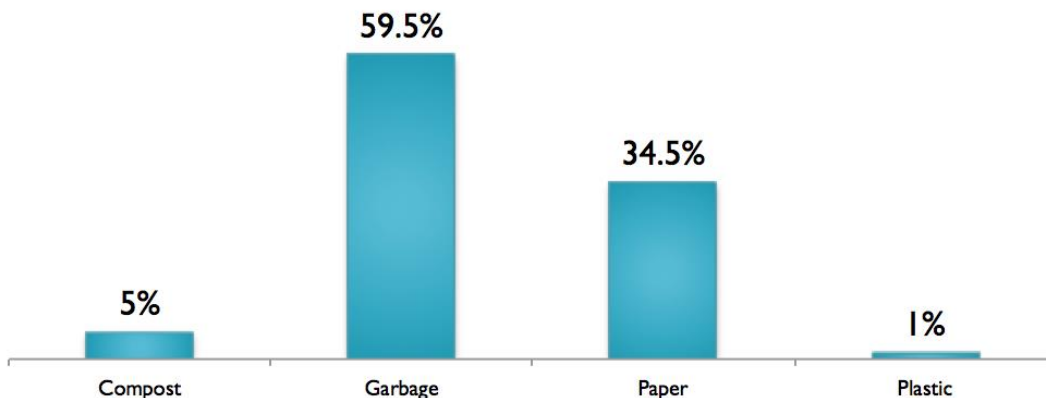


Figure 3 displays the results from question number three of the survey: how do you dispose of your single-use cup?

This data indicates disposal habits of single-use cups. From this data, one can conclude that over forty percent of survey participants improperly disposed their single-use cups in paper recycling, plastic recycling and compost streams. Moreover, of the disposal of single-use cups in paper recycling streams was the largest source of improper disposal habits representing over 34 percent of survey participants. This data supports the findings from the 2008 solid waste audit carried out at Dalhousie which claimed that single-use cups were a significant source of contamination in all waste streams due to improper disposal (Davidson, 2011).

5.4 Survey Question #4

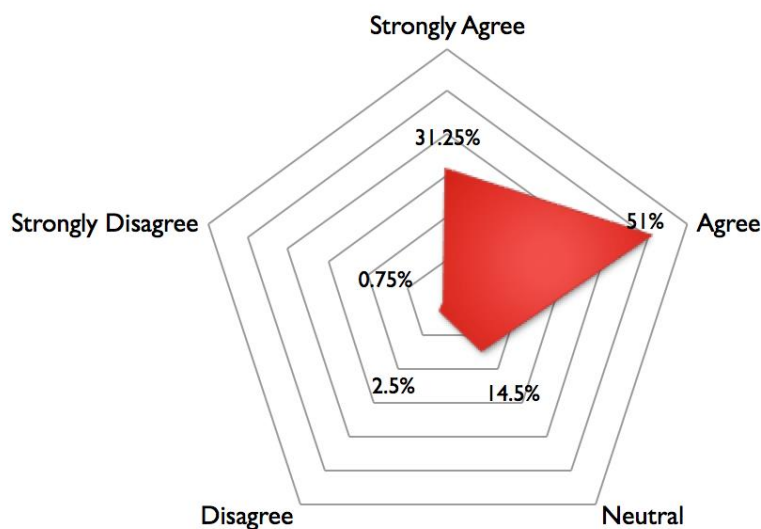


Figure 4 displays the results from question four of the survey: do you agree that single-use cups are unnecessary waste?

This data demonstrates that 82.25% of survey respondents were in some level of agreement that single-use cups are unnecessary waste. The same question was posed in 2004 study on single-use cup minimization on the Dalhousie campus which yielded similar results which found 94% of students surveyed considered single-use mugs unnecessary waste on campus (Alsop et al., 2004). This is an indication this belief is still present and prominent within the Dalhousie community a decade later.

5.5 Survey Question #5

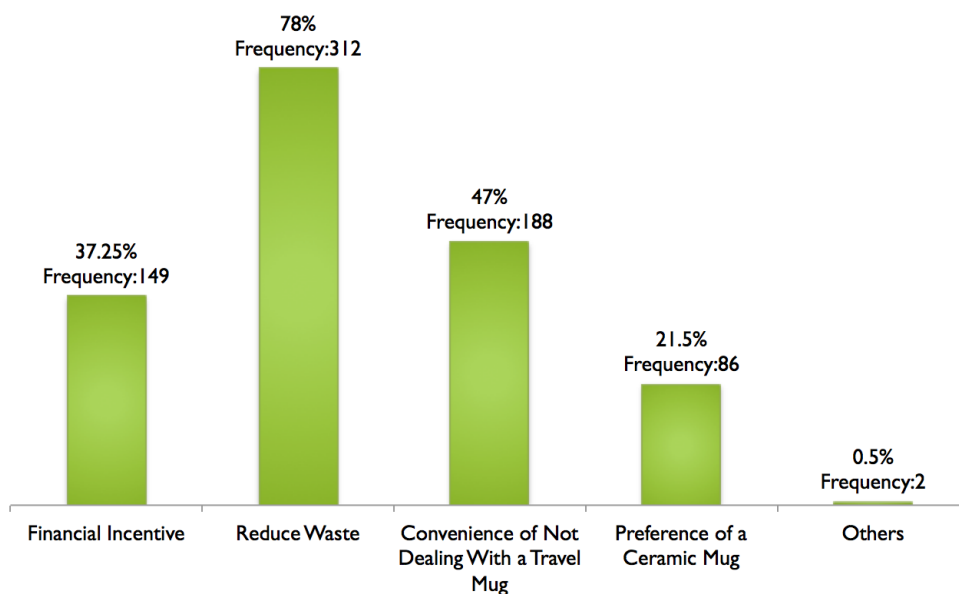


Figure 6 displays the result from question 5 of the survey: what factor would encourage your participation in the Mug-Share program?

When participants were asked what factors would encourage their participation in the Mug-Share program the largest incentive, representing 78% of responses, was the desire to reduce single-use cup waste. Following waste reduction, convenience of not having to carry and tend to personal reusable mug and the financial incentive of the program were the next most popular incentives representing 47% and 37.25% of responses respectively.

5.6 Survey Question #6

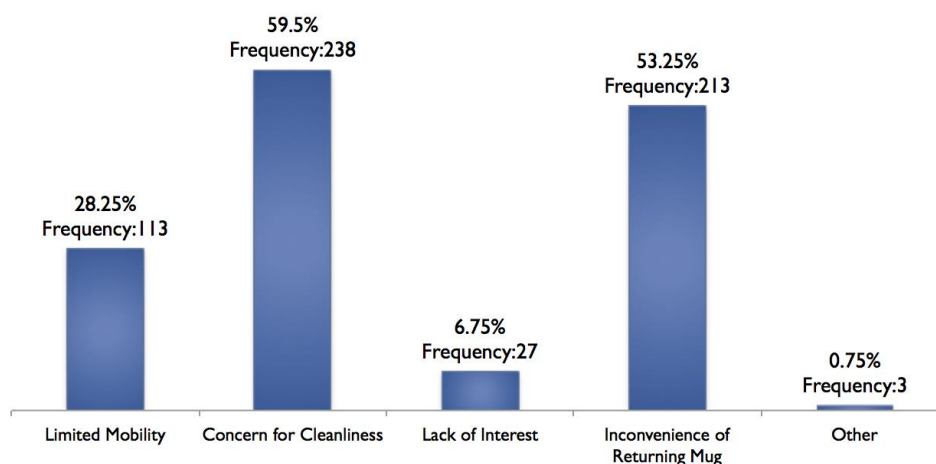


Figure 7 displays the results from question 6 of the survey: what factors would discourage your participation in the Mug-Share program?

When participants were asked what factors would discourage their participation in the Mug-Share program, concern for cleanliness and concern with the inconvenience of returning the mug were the most common responses with 59.5% and 53.25% respectively. Concern for limited mobility was secondary concern however it still represented 28.25% of responses.

5.7 Survey Question #7

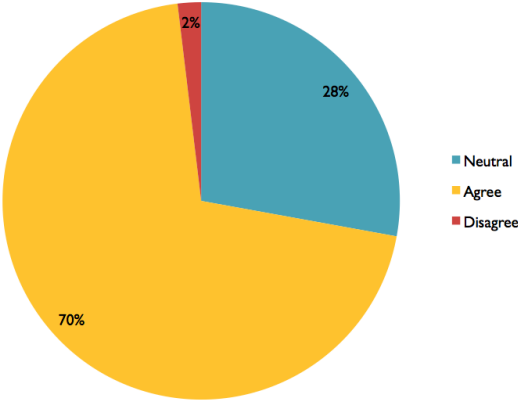


Figure 8 displays the results from question 6 of the survey using a likert scale: I would be more likely to participate in the Mug-Share program if there was a 20-cent reduction in beverage cost.

When asking whether 20-cent reduction in beverage cost would further encourage their participation approximately 75% of participants are more likely to participate if incentives increased from 10 cents while 24.25% of participants were neutral 2% of participants would not be further attracted.

5.8 Survey Question #8

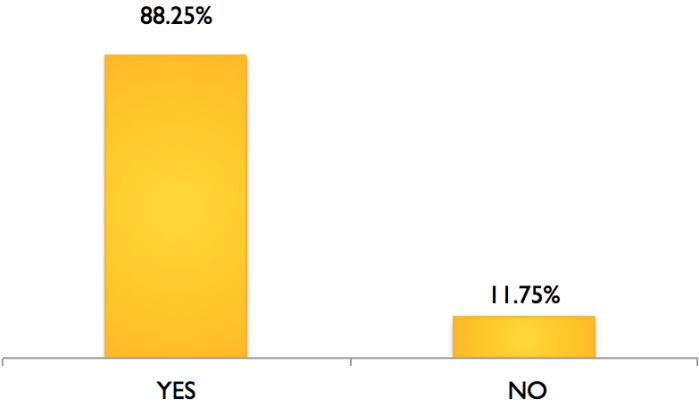


Figure 9 displays the results from question 8 of the survey: would you participate in the Mug-Share program?

When asked if you would participate in the Mug-Share Dalhousie program 88.25% said they would participate in the program.

6.0 Discussion

The main objective of this research was to explore whether a Mug-Share program would be supported by the Dalhousie University population on Studley Campus in an effort to minimize single-use cup waste. This study gathered Dalhousie community's opinion on single-use cups, their usage and disposal. In addition it aimed to identify the factors that would shape individual's participation in a Mug-Share program.

This study identified that the Dalhousie community would in fact support the Mug-Share program on Dalhousie campus. 88.25% of survey respondents said that they would actively participate in the program. The key incentive motivating individuals to participate in the program was a desire to reduce waste, with 78% of respondents identifying this as a motivating factor. The convenience of not lugging around and washing a personal travel mug was the second greatest incentive as identified by 47% of participants.

In contrast, 59.5% of respondents were discouraged from participating due to a concern for cleanliness and 53.25% of respondents were discouraged from participating due to inconvenience of returning the mug. Some significant findings that were encountered in this research were that 94% of research participants consume between 1 and 9 hot beverages in single-use cups per week, 40% of which are improperly disposed. This study found that 82% of research participants believe that single-use cups were unnecessary source of waste.

In consideration of the findings in the light of existing research studies, this study has provided a solid understanding of the potential implications Mug-Share program and the foreseen benefits and barriers identified by students, staff and faculty in participating in the Mug-Share program. These findings echo the success of similar programs in other universities such the Barrow-a-Mug program at the University of Northern British Columbia which has effectively minimized single-use cup waste and engaged the university community. This research can be used as a framework for further research regarding single-use cup waste minimization initiatives at Dalhousie University.

7.0 Conclusion

The most significant finding of this research is that 88% of the population surveyed would participate in the Mug-Share Dalhousie program. While these results are not representative of the entire Dalhousie community on the Studley campus, the outcome of this study is a strong indication that the Mug-Share program would be successful in engaging students, staff and faculty and would be effective in minimizing waste generated by single use cups.

Based on these findings, it is recommended that Dalhousie University pilot the Mug-Share program in the Killam and Student Union Building locations. Building on the findings of this study, future areas of research could address the willingness of retailers to support the program, the costs associated with the program and the health and safety implications. The scope

of this study could also be broadened to include various locations outside of the Killam Library and Student Union Building on the Studley Campus. This research, coupled with the findings of the pilot project, could guide and inform the implementation of the Mug-Share program in the University as a whole.

8.0 Acknowledgements

The Dalhousie Mug-Share Program researchers would like to acknowledge the support of instructor Tara Wright and mentor Adam Cheeseman for their guidance throughout this study.

9.0 References

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10. Appendices

10.1 Survey Questions

ENVS 3502

Mug-Share Survey

In an effort to reduce waste associated with single-use cups at Dalhousie, we are interested in implementing a reusable mug-sharing program on campus. The Mug-Share program would make reusable mugs available to students in locations throughout the campus where beverages are sold. Students, staff and faculty may borrow a mug free of charge to enjoy their beverage and return the mug after use. This survey is being conducted to gauge interest in the program. Thank you for your participation. If you feel uncomfortable at any point in time, you may leave without consequence. If you have any comments, questions or concerns please contact Rosa Poirer-McKiggan at rs266590@dal.ca.

1. On avg. how many hot beverages do you purchase on campus each week? (Circle one)

- a. 0 b. 1-2 c. 3-4 d. 5-6 e. 7-8 f. 9+

2. On avg. of your total hot beverage purchases, how many were using a single-use cup? (Circle one)

- a. 0 b. 1-2 c. 3-4 d. 5-6 e. 7-8 f. 9+

3. How do you dispose of your single-use cup? (Circle one)

- a. Compost
b. Garbage
c. Paper Recycle
d. Plastic Recycle

4. Do you agree that single-use cups are unnecessary waste? (Circle one)

Strongly Agree Agree Neutral Disagree Strongly Disagree

5. What factors would encourage your participation in the Mug-Share program? (Circle all that applies)

- a. Financial incentive of 10 cents
- b. Reducing waste
- c. Convenience of not having to carry or wash travel mug
- d. Preference of using a ceramic mug
- e. Other: _____

6. What factors would discourage your participation in the Mug-Share program? (Circle all that applies)

- a. Limited Mobility
- b. Concern for cleanliness
- c. Lack of interest
- d. Inconvenience of returning mug
- e. Other: _____

7. I would be more likely to participate in the Mug-Share program if there was a 20-cent reduction in beverage cost. (Circle one)

Strongly Agree Agree Neutral Disagree Strongly Disagree

8. Would you participate in the Mug-Share program?

Yes / No

Thank you for participating in our survey! Enjoy your cookie.

10.2 Data Tables

Q1 & Q2		On average how many hot beverages do you purchase on campus each week?		On average of your total hot beverage purchases, how many were using a single use cup?	
No. of cups	Respondants	Percentage %	Respondants	Percentage %	
a.0	7	1.75	32	8.00	
b.1-2	100	25.00	166	41.50	
c.3-4	169	42.25	134	33.50	
d.5-6	78	19.50	47	11.75	
e.7-8	35	8.75	11	2.75	
f.9+	11	2.75	10	2.50	
Total:	400		400		
STATS					
Mode:	c. 3-4		b. 1-2		
Average:	3.83 cups		2.87 cups		

Q3		How do you dispose of a single use cup?		Q4		Do you agree that single use cups are unnecessary waste?	
Disposal Options	Respondants	Percentage %	Rating Scales	Respondants	Percentage %		
a.Compost	20	5.00	Strongly Agree	125	31.25		
b.Garbage	238	59.50	Agree	204	51.00		
c.Paper Recycle	138	34.50	Neutral	58	14.50		
d.Plastic Recycle	4	1.00	Disagree	10	2.50		
			Strongly Disagree	3	0.75		
Total:	400		Total:	400			
% Dispose in Garbage:	59.50		% Agree:	82.25			
% Others:	40.50		% Disagree:	3.25			

Q5		What factors would encourage your participation in the Mug-Share Program?		Q6		What Factors would discourage your participation in the Mug-Share program?	
Circle all that applies	Frequency	Percentage %	Circle all that applies	Frequency	Percentage %		
a.10 Cents Financial Incentive	149	37.25	a.Limited Mobility	113	28.25		
b.Reducing Waste	312	78.00	b.Concern for Cleaness	238	59.50		
c.Convenience of Not Carry Travel Mugs	188	47.00	c.Lack of interests	27	6.75		
d.Prefer Ceramic Mug	86	21.50	d.Inconvenience for returning	213	53.25		
e. Others	2	0.50	e.Other	3	0.75		
STATS							
Mode:	b.Reducing Waste		Mode:	b.Concern for Cleaness			

Q7	I would like to participate in the MugShare program if there was a 20¢ reduction in beverage cost	
Rating Scales	Respondants	Percentage %
Strongly Agree	117	29.25
Agree	178	44.50
Neutral	97	24.25
Disagree	8	2.00
Strongly Disagree	0	0.00
Total:	400	
% Agree:		73.73
% Disagree:		2.00

Q8	Would you participate in the Mug-Share program?	
	Respondants	Percentage %
YES	353	88.25
NO	47	11.75
Total:	400	

10.3 Ethics Review

ENVIRONMENTAL PROGRAMMES

FACULTY OF SCIENCE

DALHOUSIE UNIVERSITY

APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS

GENERAL INFORMATION

1. Title of Project: **Dalhousie Mug Share**

2. Faculty Supervisor(s) **Tarah Wright**
Department: **Environmental Science**
Ext: **(902)-494-3683**
e-mail: **tarah.wright@dal.ca**

3. Student Investigator(s) Department e-mail: Local Telephone Number:

1) Rui Gui: Environmental Science rz492848@dal.ca (902)-999-6861

2) Natasha Irich: Sustainability and International Development Studies natashairich@gmail.com
(647)-505-0553

3) Rosa Poirier-McKiggan: Political Science and Sustainability rs266590@dal.ca
(902)-240-5062

4) Jordyn Stafford: Environmental Science and Sustainability jordynstafford@live.com
(416)-937-6422

4. Level of Project:
Non-thesis Course Project []
Undergraduate []
Graduate []
Specify course and number: **ENVS 3502 ENV Problem Solving II**

5. a. Indicate the anticipated commencement date for this project: **Monday, March 9, 2015**

- b. Indicate the anticipated completion date for this project: **Friday, April 17, 2015**

SUMMARY OF PROPOSED RESEARCH

1. Purpose and Rationale for Proposed Research

Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated.

The purpose of this study is to explore whether a Barrow-A-Mug pilot project would be feasible in the Killam Library during fall and winter academic terms. Our study will be guided by the follow research question:

What are the benefits and barriers to implementing a Borrow-A-Mug program in the Killam Library at Dalhousie?

In testing the feasibility of the Barrow-A-Mug pilot project in the Killam Library, we intend to gain a comprehensive understanding of the practical implication of the project. If our findings indicate that the pilot project is feasible, we hope they will guide the implementation of the pilot project with the goal of reducing waste generated by single-use cups and furthering Dalhousie's waste minimization and diversion initiatives.

2. Methodology/Procedures

- a. Which of the following procedures will be used? Provide a copy of all materials to be used in this study..

- Survey(s) or questionnaire(s) (mail-back)
- Survey(s) or questionnaire(s) (in person)
- Computer-administered task(s) or survey(s)]
- Interview(s) (in person)
- Interview(s) (by telephone)
- Focus group(s)
- Audio taping
- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations
- Other, specify _____

Survey Questions:

b. Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.

The sequence of procedures for this study are fairly simple. Firstly, we will conduct the study for two weeks in the Killam Library by asking as many staff and faculty as possible. Then we will take a day to gather and record the results from the questionnaire. From there we will take this data and attempt to use this information to see if the Mug Share program is a feasible option for the Dalhousie Campus.

3. Participants Involved in the Study

a. Indicate who will be recruited as potential participants in this study.

- Dalhousie Participants: Undergraduate students
 Graduate students
 Faculty and/or staff
- Non-Dal Participants: Children
 Adolescents
 Adults
 Seniors
 Persons in Institutional Settings (e.g. Nursing Homes, Correctional Facilities)
- Other (specify) _____

b. Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.

For this study gender, age and group affiliation are irrelevant.

c. How many participants are expected to be involved in this study? 400

4. Recruitment Process and Study Location

a. From what source(s) will the potential participants be recruited?

- Dalhousie University undergraduate and/or graduate classes
 Other Dalhousie sources (specify) Staff and Faculty at Dalhousie University

- Local School Boards
- Halifax Community
- Agencies
- Businesses, Industries, Professions
- Health care settings, nursing homes, correctional facilities, etc.
- Other, specify (e.g. mailing lists) _____

b. *Identify who will recruit potential participants and describe the recruitment process. Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts).*

Script to Introduce Survey to Students:

“Hi, my name is _____ and my colleagues and I are doing a research project. Our project aims at reducing waste from disposable cups on the Dalhousie campus. All of the data that we collect today will be kept anonymous and when you are done answering the questions on the paper go ahead and slip it into the box on the table! Please do not identify yourself and if at anytime you do not feel comfortable answering the questions you may dispose of your questionnaire and it will no longer be used.”

5. Compensation of Participants

Will participants receive compensation (financial or otherwise) for participation?

Yes No

If Yes, provide details:

Participants will receive a cookie upon completion of the survey.

6. Feedback to Participants

Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used. Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement.

Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

In terms of the feedback to participants we will be thanking them with a cookie as well as providing Tarah Wright (our professors) contact information if they have further concerns. Considering the study is completely anonymous we do not see there being any ethical problems. However, the contact information will be available to the participants if they wish. We will print the information on cards below and have them available to participants at the table that they will fill out the survey.

INFORMATION

“All information that you record is anonymous and will only be used with your consent. If you have any further concerns or questions please contact the professor below.”

Faculty Supervisor(s) Tarah Wright

Department: Environmental Science

Ext: (902)-494-3683

e-mail: tarah.wright@dal.ca

POTENTIAL BENEFITS FROM THE STUDY

1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.

If the results from the study show that the Mug Share Project is of interest to the Dalhousie students, staff and faculty it may result in the implementation of the pilot project. This would allow participants to have a sustainable consumers choice. Participants could potentially gain direct benefits such as engaging in environmental and sustainability issues on campus. They will also be able to learn about their consumer choices and behaviors and learn how they are affecting Dalhousie campus. The incentive allows participants an option of a cookie from their involvement in the project.

2. Identify and describe any known or anticipated benefits to society from this study.

If the results from the study show that the Mug Share is of interest to the Dalhousie students, staff and faculty it may result in the implementation of the pilot project. This would allow society to become more aware about how many disposable cups they use along with presenting consumers an alternative more sustainable option of drinking hot beverages. This could directly impact society by providing a cleaner, greener community as well as an opportunity to get their everyday drinks for a lower price.

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors

[] No known or anticipated risks
Explain why no risks are anticipated:

No risks are anticipated. Participants will be asked a few questions about their opinions on reusable and disposable mugs and will be given an opportunity to opt out of the questions at any time. All questionnaires will remain anonymous.

[] Minimal risk
Description of risks:

- Greater than minimal risk
Description of risks:

2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1.

No risks are anticipated, however safeguards such as participants answering anonymously and inserting their questionnaire into a box to ensure their anonymity will be in place to insure that the physical and psychological health of the participants are kept to none.

INFORMED CONSENT PROCESS

Refer to: <http://pre.ethics.gc.ca/english/policystatement/section2.cfm>

1. What process will be used to inform the potential participants about the study details and to obtain their consent for participation?

- Information letter with written consent form; provide a copy
 Information letter with verbal consent; provide a copy
 Information/cover letter; provide a copy
 Other (specify) Information given verbally/verbal consent-

Script to Introduce Survey to Students:

“Hi, my name is _____ and my colleagues and I are doing a research project. Our project aims at reducing waste from disposable cups on the Dalhousie campus. All of the data that we collect today will be kept anonymous and when you are done answering the questions on the paper go ahead and slip it into the box on the table! Please do not identify yourself and if at anytime you do not feel comfortable answering the questions you may dispose of your questionnaire and it will no longer be used.”

2. If written consent cannot be obtained from the potential participants, provide a justification.

Students and Faculty are given the option to dispose of their survey at any time and are given an extensive introduction about the anonymity of the project before being handed the survey.

ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA

1. Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.

There will be an extensive explanation as to how the participant's confidentiality is kept anonymous verbally. As well as a box will be provided for participants to put their data into (with no names on the paper). This way we can mix up the data in the box and will never be able to pin point what paper is what and the participants will never have to worry about being identified. When the findings are released there will be no names and ourselves the researchers will never know the names of the participants to begin with.

2. Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.

All questionnaires will go into a box and will only be in the possession of the group members. These will be secured in an envelope and will only be opened as a group on Dalhousie campus. However, there is no risk of any names coming out due to the study not needing any names at all. This gives full confidentiality to the participants.

3. Indicate how long the data will be securely stored, the storage location, and the method to be used for final disposition of the data.

- Paper Records
- Confidential shredding after _____ years
- Data will be retained indefinitely in a secure location
- Data will be retained until completion of specific course.
- Audio/Video Recordings
- Erasing of audio/video tapes after _____ years
- Data will be retained indefinitely in a secure location
- Data will be retained until completion of specific course.
- Electronic Data
- Erasing of electronic data after _____ years
- Data will be retained indefinitely in a secure location
- Data will be retained until completion of specific course.
- Other _____

(Provide details on type, retention period and final disposition, if applicable)

Specify storage location: In the possession of Rui, Natasha, Rosa and Jordyn near Dalhousie Campus.

ATTACHMENTS

Please check below all appendices that are attached as part of your application package:

- [] Recruitment Materials: A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.
- [] Information Letter and Consent Form(s). Used in studies involving interaction with participants (e.g. interviews, testing, etc.)
- [] Information/Cover Letter(s). Used in studies involving surveys or questionnaires.
- [] Parent Information Letter and Permission Form for studies involving minors.
- [] Materials: A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

SIGNATURES OF RESEARCHERS

Rui Gui

Signature of Student Investigator(s)

Sunday, March 8, 2015

Date

Natasha Irich

Signature of Student Investigator(s)

Sunday, March 8, 2015

Date

Rosa Poirier-McKiggan

Signature of Student Investigator(s)

Sunday, March 8, 2015

Date

Jordyn Stafford

Signature of Student Investigator(s)

Sunday, March 8, 2015

Date

Signature of Student Investigator(s)

Date

Signature of Student Investigator(s)

Date

Signature of Student Investigator(s)

Date

FOR ENVIRONMENTAL PROGRAMMES USE ONLY:

Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

Signature

Date

10.4 Preliminary Proposal

Mug Sharing at Dalhousie

Preliminary research proposal

Rui Guo
Natasha Irich
Rosa Poirier-McKiggan
Jordyn Stafford
Zach Warne

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1. Project Definition

Comprehensive solid waste management programs are one of the *greatest challenges* in achieving overall sustainability in institutions of higher education (Smyth, D et al., 2010). As of 2014, Dalhousie University has achieved the target of 55% waste diversion outlined in the University Sustainability Plan and is currently diverting approximately 60%. To build on this momentum, Dalhousie University has committed itself to a landfill diversion rate of 75%. In order to realize these targets, Dalhousie University has outlined a comprehensive solid waste management plan that employs “a holistic management approach to improving waste minimization and diversion efforts” (Davidson, G., 2011, pg. 3; Dalhousie Office of Sustainability, 2014; Dalhousie Office of Sustainability, 2015). Decisions regarding waste management should be informed by the concept of waste hierarchy, which posits that the most effective way to manage waste is to reduce it at its source (Harris, B.,; Probert, E., 2009; Davidson, G., 2011). A 2004 study on waste associated with single-use cups at Dalhousie found that approximately 57 280 single-use cups were discarded on the Studley campus per month. This constituted 9% of total waste produced on the Studley Campus (Alsop, J., et al., 2004, April 13) . This degree of needless waste is unacceptable in an institution that has committed itself to achieving campus sustainability. The excessive waste generated by single-use cups has led many universities and colleges to initiate waste minimization efforts through the promotion of refillable cups (Harris, B. & Probert Waste, E., 2009; Mason, A. et al., 2003; Smyth, D et al., 2010; Tchobanoglous, G., et al., 2006). The University of Northern British Columbia, for example, has run a successful program for three years that provides reusable cups on campus and offers a financial incentive to any person using the program. This program, formally known as Barrow-A-Mug or BAM, has been very popular among students and staff and has significantly contributed to waste minimization on their campus (Munoz, G., 2012). While research specific to Dalhousie University has focused on waste generated by single-use cups and potential for

financial incentives to encourage the use of reusable cups (Alsop, J., et al., 2004, April 13; Fairbarin, M. et al., 2008) it has yet to explore whether a program such as Borrow-A-Mug could be successfully employed. The purpose of this study is to explore whether a Borrow-A-Mug pilot project would be feasible in the Killam Library during fall and winter academic terms. Our study will be guided by the follow research question:

What are the benefits and barriers to implementing a Borrow-A-Mug program in the Killam Library at Dalhousie?

In testing the feasibility of the Borrow-A-Mug pilot project in the Killam Library, we intend to gain a comprehensive understanding of the practical implication of the project. If our findings indicate that the pilot project is feasible, we hope they will guide the implementation of the pilot project with the goal of reducing waste generated by single-use cups and furthering Dalhousie's waste minimization and diversion initiatives.

2. Background and Rationale

2.1 Environmental Impacts of Single-Use Cups

Single-use cups are in wide circulation across Dalhousie's Studley campus. Composed of paper covered in an insulating wax layer, these cups are unable to be recycled in the HRM area; for the wax prevents the paper from effectively breaking down (Martin, 2006). Evidently these cups are then sent to the landfill ending their linear life cycle. Many consumers are unaware of how to properly dispose of single-use cups, discarding them into the compost and recycling streams. When a single-use cup is placed in the improper disposal receptacle it contaminates the entire contents of the bin thus redirecting all of the properly composted and recycled materials to the landfill (Davidson, 2011).

In addition, proper disposal of single-use beverage containers proves to be a concern when observing litter throughout the province of Nova Scotia. According to a 2004 province wide litter survey, single-use cups constituted 15% of total litter collected (Allen, Saccary, Wishart & Vigneau, 2004). A 2008 survey found that the quick service industry made up 30% of litter collected of which 82% consisted of disposable cups, utensils and straws (Oakley, Macleod, Brown & Higgins, 2008).

Although the waste associated with one single-use cup is seemingly small on its own, when looking at global consumption patterns the waste is unfathomable. Globally, 500 billion single-use cups are sent to the landfill each year (Woods & Bakshi, 2014). In order to minimize the excessive and unnecessary waste generated by single-use cups, many institutions, businesses and individual consumers have looked to reusable ceramic mugs as an alternative (Harris, B. & Probert Waste, E., 2009; Mason, A. et al., 2003; Smyth, D et al., 2010; Tchobanoglous, G., et al., 2006; Woods L., & Bakshi, B. R., 2014; Ziada, H., 2009 December 15). In order to fully comprehend the environmental impact of a single-use cup, one must analyze its impact in each

stage of its life cycle: from acquisition of raw material to production, use and disposal (Häkkinen, T., & Vares, S., 2010). There are multiple academic studies that have explored the life-cycle analysis of single-use cup versus reusable mugs. These studies have come to varying conclusions however there is general consensus that ceramic, glass and various plastic reusable cups are superior to single-use cups after a break-even point (Woods & Bakshi, 2014; Ziada, H., 2009 December 15). The break even point for ceramic mugs is 31 uses signifying that if a ceramic mug is used on 31 occasions it is more environmentally sound than a disposable cup (Carbon Clear, 2012).

2.2 Waste Management in the Province of Nova Scotia

Nova Scotia's Solid Waste Management Strategy was introduced in 1995 to address public concerns surrounding landfills and the incineration of waste (Dalhousie University Office of Sustainability, 2015). That year, the province of Nova Scotia passed the Environment Act (1995) that contained a solid waste diversion target of 50% by the year 2000. In order to meet these targets, the government put in place many programs including the Resource Recovery Fund Board, the ban of organic and recyclable material from the waste stream, the introduction on enviro-depots and centralized composting (Dalhousie University Office of Sustainability, 2015); Davidson, G., 2011, June). After this target was achieved, the provincial government legislated a new and ambitious target of a per capita waste disposal rate of 300kg by 2015 as part of the Environment Act (2006). A revised plan was released in 2011 Dalhousie University Office of Sustainability, 2015).

2.3 Waste Management at Dalhousie University

As an institution committed to sustainability, waste management is a critical area for action in realizing broader goals of minimizing the universities environmental burden through waste reduction and diversion. In 2010, Dalhousie introduced the Sustainability Plan, which outlined their strategic directions for achieving sustainability outcomes. The plan included a target of a 55% waste diversion by 2014. The university was successful in meeting this target and is currently diverting approximately 60% of waste from the landfill. As part of the four-year progress report, Dalhousie identified a new target of 75% diversion rate, which will be achieved through the University Waste Management Plan (Dalhousie University Office of Sustainability, 2014). Dalhousie's Waste Management is informed by the principle of waste hierarchy, which identifies the waste reduction at the top of the hierarchy-followed suit by Reduce Reuse and Recycle. Waste reduction, or waste minimization entails a reduction of waste by its generation source as an alternative to end of pipe waste management. In efforts to reduce waste, the Waste Management Plan identified education opportunities for staff and students, providing key commodities to students and staff to reduce waste and the purchasing of items that can be easily reused or recycled (Dalhousie University Office of Sustainability, 2015).

2.4 Single-Use Cup Waste at Dalhousie University

Single-use cups account for a large percent of needless waste produced on the Dalhousie Campus (Alsop, J., et. al, 2004, April 13; Fairbarin, M. et al., 2008). This has been the focus of several studies carried out by students in the ENVS 3502 Problem Solving course. A study carried out by in 2004 found that approximately 57 260 single-use cups were discarded per month on the Studley campus, which represents 9% of total waste represented 9% of total waste generated. The study found that 94% of students surveyed considered single-use mugs unnecessary waste on campus. Further, 60% of students surveyed own a reusable mug, 45% of which rarely use it. The main incentive for using reusable cups is environmental and for those who don't own a mug, the main barrier is inconvenience (Alsop, J., et. al, 2004, April 13). In 2008, a similar study found that that the 10-cent incentive to bring a reusable mug was ineffective. The largest barriers to using a reusable mug is forgetting to bring it and keeping it clean and for those who do not own a mug, it is an issue of inconvenience (Fairbarin, M. et al., 2008).

Beyond the generation of waste, a 2008 waste audit carried out at Dalhousie found that single-use cups were a significant source of contamination in all waste streams due to improper disposal (Davidson, G., 2011, June). Although the approximate waste generated by single-use cups at Dalhousie is unclear, it is evident that single-use cups constitute a significant portion of total waste generated by the University, In order to reduce unnecessary waste associated with single use cups, Dalhousie should expand its reach beyond financial incentives at Dalhousie Food Services retail locations and gratuitous coffee (AASHE, 2015, January 7).

2.5 Minimization of Single-use cup waste in Institutions of Higher Education

Many institutions of higher education have carried out waste reduction initiatives focused on single-use cups through the promotion of refillable cups (Harris, B. & Probert Waste, E., 2009; Mason, A. et al., 2003; Smyth, D et al., 2010; Tchobanoglous, G., et al., 2006) . Central to successful refillable mug campaigns is a variety of policy and education measures aimed at challenging wasteful consumer behavior (Smyth, D et al., 2010). A study carried out at Welsh University, focused on the viability of reducing single-use cup waste through a “Lug-a-Mug” program found that there was a positive response amongst students, staff and faculty. Welsh University sends approximately 20 000 disposable paper and plastic cups to the landfill on a weekly basis. The study found that increasing convenience and ease of participation, direct financial incentives, education of the problem, illustration of results from the initiative and the creation of social norms are necessary components to effective refillable mug programs (Harris, B. & Probert Waste, E., 2009). Massey University of New Zealand has successfully implemented a “Lug-a-Mug” program in their student cafeteria as key action area to further their goal to be a zero waste university (Mason, A. et al., 2003).

The University of California introduced reusable dishware including cups, plates and utensils to a festive they hold annually in an effort to minimize waste. The result was a reduction of the per capita waste generation rate of 0.22 to 1.19k per day (Tchobanoglous, G., et al., 2006). A waste characterization study carried out in the University of Northern British Columbia found that the university sent 5000 single-use cups to the landfill each week. In response to these findings, the student organizers recovered single-use cups from the waste stream, assembled them and strung them from the ceiling of the main corridors in the university advertising the findings of the study. According to student, faculty and staff, the visual display was effective in bringing the issue to light. It was then suggested that the university standardize a 20-cent incentive for using a reusable mug and purchase reusable mugs to make them available to students (Smyth, D et al., 2010). The Barrow-a-Mug program was introduced to the university in 2012 as a student-led movement to minimize waste generation from single-use cups. The program offered student, staff and faculty reusable mugs that were available in stations throughout campus where drinks were sold. After their use, the mugs were collected and cleaned by student organizers and returned to their stations. Any person who participated in the program also received a financial incentive of 10-cents (Munoz, G., 2012). The program running successfully to this date and considerable change and consumer behavior has been noticed.

3. Methods

We will conduct a literature review and use surveys, interviews, and data analysis techniques to investigate this topic. The literature review provides strong applicable background knowledge to our interests. Key research method of this study is survey/questionnaire. Survey will be conducted on campus. To be specific, the Second Cups in Killiam library, Pete's To Go and Tim Hortons in the SUB are the target locations of our research. The locations are chosen because they are located at where the diversity of the students is high. It is more likely for us to have a representative research with students form different year of study and different major. The data collected form survey will be analyzed to understand students' attitudes and identify the barriers to the adoption of Mug-Share program on campus. We want to know students' interests to find out if students would like the idea of our Mug-Share project, and gauge their willingness to participate.

Data Collection

Sampling population:

There are two main reasons for conducting a survey/questionnaire to examine students' attitudes. One is that the survey could contribute to reaching a large target audience in a relatively short period in this research; the audience is student on campus. The primary sampling populations are

the students who are in line for purchasing drinks at the three-targeted locations. We choose them as the primary individuals for the survey because they are more likely to have time to talk to us and answer our survey diligently. We will also survey randomly by intercepting available students in the library and SUB to avoid biased results.

Survey Design

The other reason to conduct survey in this study is that it is easy to analyze and code the data since the questions are designed in advance. The sampling type of our research is non-probabilistic since we choose sample population and location purposely. There are **How many?** questions in total in our survey. The research design will include **both open-ended structure and (please delete if we don't have any) closed structure (single response) questionnaires. In the end we will integrate both qualitative and quantitative data from the survey to avoid biased results (Creswell, J.,W., 2014)(Please delete if we don't have qualitative questions).** We will start with a quick introduction to our project, then giving printed survey methods to targeted individuals and recycle the answers after they complete. The survey is anonymous. We will not ask students to identify themselves, nor to look at their survey responses at the present to avoid any discomfort they may experience. The questionnaire survey is carried out from 9-17th March 2015 and the total sample size is determined to be 400 people. Each of the group members is responsible for at least 100 individuals for sampling. **Who?** will start the survey on **when??** at SUB and **who??** will do survey at library on **when??**. Group members are planning to spend at least two hours or more individually on survey conduction until the 100 people sample size for each group member is filled. Questions address students' habits of single-used cup use, knowledge of cup disposal and willingness of participation of the Mug-Share program.

Different factors are considered when developing the survey. The target audience of this survey is Dal students based on the objective of evaluating Dal students' attitudes towards disposable and reusable cup. Students will be asked about the disposal method to identify their knowledge and concern level towards single-use cup waste. The questions are designed on basis of the results of a past focus group activity which found that the main reason for students not to use reusable mug is due to the inconvenience of carrying a travel mug. In our research, students will be answering questions that encourage them from participating the Mug-Share program when they have convenient access to reusable mugs.

Data Analysis

The paper questionnaires will be collected into a box and will be summarized after the survey conduction is complete. Different data types were analyzed with different methods. We will use excel table to display the multiple-choice data to analyze the Mode, Median and the statistic proportions for each question. We will calculate the portion of the individuals that are

willing/unwilling to support our project among the entire sample population. Numerical order will be assigned to each rating scales, graded categories, or Licker scales questions. For example, scores like ‘5,4,3,2,1’ might be given in response to ‘strongly agree, agree, neutral, disagree, and strongly disagree’, and then we will calculate the Mean to reflect the degree of the agreement. Finally, we will use a flowchart to identify the key segments or any common answers from qualitative data.

Limitations

We will summarize the de-limitations of our project and will predict the limitations as well. The limitations are variables, which could change as the research proceeds. The de-limitations we imposed including risks of unrepresentative data because the targeted location only allows us to interact with a limited portion of the universities population. The predicted limitation is the unrepresentativeness of the data since the survey mainly focus on populations in the SUB and library. We constructed the schedule to help us monitor the completeness of every stage in the desired period. However, in terms of timeline and sample size, the limitations are variables that could change as the research proceeds. There could be unexpected incidents, which could prevent us from following our timeline, such as school’s closure due to storm or sickness of group members.

4. Schedule, Budget and Project Responsibilities

Budget:

Costs associated with the research project include incentives given to survey participants. We hope to acquire funding from the Dalhousie Student Union Sustainability Office. We are applying for a grant of approximately \$50.

Project Responsibilities:

Attending Tuesday group meetings: All group members

Progress reports: Each group member is to inform the others of their progress either electronically or in person during meeting times in class on Tuesday and throughout the week if necessary.

Interviews with Dalhousie Health and Safety Department and retail managers (Contacting interviewees, conducting interviews and analyzing data): all group members

Student Surveys and data analysis: all group members

Results/Recommendations: all group members

Contributing to literature reviews, writing and editing of final product: All group members

Pecha Kucha: All group members will have a part in either the preparation and/or presentation of material

Schedule:

February

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
22	23	24	25	26 <i>Research Proposal Due</i>	27	28

March

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 Survey: Zach Jordyn	3 Group Meeting	4 Survey: Natasha Rosa	5	6 Survey: Rui Zach	7
8	Natasha	10 Meeting	11 Rui	12	13 Rosa	14
15	16 Rui	17 Group Meeting	Assign roles for presentation work.	19	20	21
22	Complete rough draft of presentation work.	24 Group Meeting	25	26	27	28
29 Presentation Slides Due	30	31 Group Meeting				

April

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				2	3	4
5	6 Complete rough draft of project work.	7 Group Meeting	8	9	10	11
12	13	14 Group Meeting	15	16	17 Final Project Due	

5. Deliverables and Communication Plan**Deliverables:**

The project will create a support base for the implementation of ‘Borrow A Mug Program’. If the program were to be implemented it would aim to reduce energy, water usage and reducing waste. The program would minimize the inputs of energy that go into the processing and manufacturing of disposable cups. BAM will also focus on fostering a community of sustainable practices and initiatives at the university community level. The project will aim to deliver the goal of helping Dalhousie meet and exceed their recycling targets.

Communication plan:

The ‘Borrow A Mug Program’ will focus on the target audience of student, staff and faculty at Dalhousie. More specifically the program will primarily aim to engage the sustainability office, facilities management, student staff and faculty who would all have direct and easy access to the program. BAM strives to create a comprehensive and engaging report that will captivate an audience that will be continuously be interested in creating a support base for the program. The goal is to have a sincere interest from the Dalhousie community that will engage with the program frequently.

As for the presentation of the findings of BAM at the pecha kucha we will create an engaging and interactive presentation. The target audiences at the pecha kucha are the students and staff that would make it possible and worthwhile to starting the mug sharing program. It is important to communicate the programs goal of reducing waste and making Dalhousie an even greener campus. If interests are expressed to carry out the program, we will present our findings to all the stakeholders and carry on towards implementing the program.

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7. Appendices

Appendix A

Script to introduce Borrow-A-Mug program to Second Cup Store Manager and Facility Management:

Hi, my name is _____ and my colleagues and I are doing a research project for our third year class Campus as a Living Laboratory. Our project aims at reducing waste from disposable cups on the Dalhousie campus. We would love to work together with you in order to help you still receive the same loyal customers, along with helping reduce waste for both your business and the environment. We were wondering if you could spare approximately ten minutes for us to ask you a couple of questions?

Interview Questions:

Facility management:

- 1) Would you support our project (by offering cleaning service for example)?
- 2) What are the difficulties you have preventing you from supporting this project?

Business manager:

- 1) Would you support our project (by providing an incentive or discount)?
- 2) Would your staff be open to tallying the mugs used?
- 3) What are the difficulties you have preventing you from supporting this project?

Appendix B

Script to Introduce Survey to Students:

Hi, my name is _____ and my colleagues and I are doing a research project for our third year class Campus as a Living Laboratory. Our project aims at reducing waste from disposable cups on the Dalhousie campus. We would love if you would take just two quick minutes of your time to answer a couple questions to help us make this goal a reality! We have a free cookie for you if you would like to enjoy after.

Thanks for your time!

Survey questions to students:

- 1) What's your major?
- 2) How many hot beverages do you purchase in the Library's 2nd Cup per week?
- 3) Will you participate in our project with/without the discount (depends on the results from interview)?

Yes/No

- 4) Do you have any concerns or recommendations towards our project?

Appendix C

DSUSO Funding Application A Applications from Individuals Totalling \$50 or Less

The DSUSO Green Initiatives fund is designed to empower Dalhousie students who pay DSU levy fees to pursue projects and opportunities that benefit the greater Dalhousie Community. While the DSUSO seeks to fund as many projects as possible, priority will be given to applications that prove the greatest overall benefit to the applicant. These benefits include, but are not limited to: personal growth; inclusion of others; environmental and social benefits; and

community engagement. Please ensure you have completed the grant application checklist before submitting your application.

1. Name of DSU member applying for grant:

2. Student Number:

3. Mailing Address:

4. Phone Number:

5. E-mail Address:

6. Total Amount Requested:

Please attach a detailed budget of the project, trip, or event. This budget should include the total cost, how DSUSO funding will be spent, in-kind donations requires, and all other funding expected from other sources (confirmed or outstanding).

7. The 'Borrow A Mug Program' primarily aims to create a support base for the implementation of reusable ceramic mugs to minimize the inputs of energy that go into the processing and manufacturing of disposable cups. 'BAM' will promote environmental, social, and economic sustainability by providing an incentive for cheaper hot drinks with a ceramic mug along with the promise of minimizing both waste and energy that would have been involved with their disposable mug purchase.

8. 'BAM' can produce many benefits. Some of the benefits include; less waste from disposable cups for the businesses involved, less litter in the HRM and on Dalhousie campuses, a better incentive for the waste management program at Dalhousie and the community, as well as more business for the businesses involved due to the incentive of a more 'student budget' friendly hot drink due to the lower prices with a ceramic mug.

9. Provide a timeline for your project/event/trip: