

An Investigation Into: **UBC Mug-Share Pilot Project**

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Abstract

This investigation examines the newly implemented Mug-share Pilot and makes recommendations to the program based on both primary and secondary research. Firstly, literary research on other mug-share programs is presented in order to form the basis for recommending modifications to certain practices. This report will consider the mug-share programs of: University of Northern British Columbia, University of Victoria, and Boston University. Secondly, the current Milano Stainless Steel tumbler, a corn plastic mug, and a glass mug are examined using a Triple-Bottom Line (TBL) approach to determine which is the most viable mug for the program is. Additionally, primary research was conducted and used as an indicator of what potential customers would be interested in, in terms of mug style, and utility. Thirdly, the method of tracking when mugs have been taken out and have been returned is examined and recommendations are made to improve this. The purpose of this investigation is to provide information to the stakeholders (Mug-Share Program Coordinators and UBC SEEDS) that facilitates the success of the Mug-Share program.

The scope of this project is relatively small, the Mug-Share Pilot is only present in three small, student run cafes on campus. It is assumed that the Mug-Share program, if successful will be allowed to move up into UBC Food Services locations, thus expanding the program.

There are a lot of ways that other universities have made sustainability fun, weather that be customizable mugs, or a monthly competition. These are relatively easy additions to the program that could greatly increase participation on campus. Additionally, joining forces with sustainability clubs, would also allow for a broader client base. It's important to start with those people who are already considering themselves to be 'sustainability-friendly' and then go from there. In terms of mugs, there a lot of options, however, the "Joco" glass mug seems to be the best option in terms of durability, and visual appeal. The non-technical approach is ideal for the current Mug-Share program since it is being implemented in cafes that are not only less popular, but are also student-ran and do not have as big a budget as those cafes associated with UBC Food Services. If the Mug-Share program was to expand into coffee shops operated by the AMS, UBC Food Services, or bigger brands such as Tim Hortons or Starbucks, then a technical approach would be a more convenient approach.

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List of Abbreviations

University of British Columbia (UBC)

Triple-Bottom Line (TBL)

University of Northern British Columbia (UNBC)

University of Victoria (UVic)

Boston University (BU)

Borrow-A-Mug (BAM)

Love My Mug (LYM)

Polylactic Acid (PLA)

Risk Management Program (RMS)

Alma Mater Society (AMS)

1.0 Introduction

UBC SEEDS Sustainability Program finds that at least 1.5 million disposable coffee cups are generated on the UBC campus each year (Boyd, 2016). To experiment with solutions to this amount of waste, the student sustainability organization, Common Energy, is leading a Mug-Share Pilot Program. Students are able to pay a \$5 deposit and receive a reusable to-go mug from one of three cafes: Seedlings, Sprouts and Agora. The mug is intended to be returned after a 1-2 days of use at which point it will be returned, and then washed by the participating cafes. The Mug-share participant would receive a fresh to-go mug.

Concerning the TBL analysis, the mugs compared are: the current Stainless Steel Mug, a potential Corn Plastic mug, and a potential glass mug. This scope limitation should therefore imply there are potentially better mug candidates not discussed in this report. The cross section of surveyed students is also of special consideration. No control method is used to determine the surveyed students' bias towards a mugshare program. Therefore, the data collected may be misrepresentative of the university body's thoughts toward the project. Additionally, there are limits present in the tracking methods, Agora does not have the technology to implement a technically difficult solution (i.e. they do not have access to a computer). Thus, this necessitates a technical and a non-technical tracking method.

2.0 Literature Review of other Mug-Share Programs

A study of the mugshare programs at other universities was made, looking at the University of Northern British Columbia (UNBC), University of Victoria (UVic), and Boston University (BU).

2.1 University of Northern British Columbia (UNBC)

The Borrow-A-Mug (BAM) program was started in 2012 at UNBC as a project to reduce the amount of disposable cups used at the university. Originally, ceramic mugs were donated by the community, and these mugs would be situated along a wall on the way to shops such as Tim Horton's so as to increase accessibility. "Paint your own mug" days were also held in an attempt to draw in more participants to the mug-share program as well as foster attachment in existing participants. The mugs would be rounded up at the end of the day by volunteers from the walls to take to cleaning, and would be restocked the next day. One of the barriers for this program was the sanitary requirements, and was solved by arranging for the use of an industrial dishwasher at a nearby pub. (Munoz, 2013) In 2014, the BAM program was revamped to add a new line of ceramic mugs that had a consistent branding to increase awareness of the program, as well as the addition of a more centralized location for mug collection. The BAM program also partnered with other community programs such as Chartwells and Ancillary services to fund and wash the new line of mugs, in turn reducing the dependence on the daily volunteers.

What seemed to have worked at UNBC was the placement and accessibility of the mugs due to their location in front of popular cafes, such as Tim Horton's. This ensured that it was convenient for the participants of the mug-share program. Forming partnerships with the local programs also secured funding for the continual expansion of the program, allowing BAM to purchase new mugs and increase awareness.

2.2 University of Victoria (UVic)

UVic's "Love My Mug" (LYM) program began in 2015, and the concept follows the theme of a "Bring your own Mug" program. The goal of the program is to eliminate all disposable cups on campus by 2020. They offer iconic thermal travel mugs for \$15, and participants are encouraged to personalize their mugs at events showcasing the LYM program. A unique aspect at the events is the ability for participants to take "Mugshots!", which record the participant's entry into the LYM program, as well as take photographs with the LYM Mascot. UVic also hosts additional free snack events which require students to bring their own containers. (Ahrony, 2015) At these events students were also encouraged to communicate about and showcase their mugs to students who did not possess a reusable mug, thereby increasing the spread of the LYM program across the student body.

What seemed to have worked at UVic was the many different aspects to the program that drew the students in. The “Mugshots!” Idea is unique and also acts as a memento for students in the future. The LYM mascot also serves as a recognizable character for students. Creative ideas similar to this could be implemented into the current UBC Mug-share pilot to help increase awareness of the pilot. It should be noted that awareness of the LYM seems to be a barrier to the expansion of the program. Only 52 people attended the free snack event, and this need for awareness may need to be taken into consideration when exploring methods to increase UBC Mug-share awareness. (Ahrony, 2015)

2.3 Boston University (BU)

Boston University hosts a “Join the Challenge” program, a monthly competition which encourages participants to reduce their environmental footprint. Students sign up individually or in groups for different challenges online such as using their reusable mug instead of a paper cup, and upon completion of these challenges the students are given CO₂ reduction credits. These reduction credits contribute to their overall score at the end of the month, and the winners are recognized and awarded prizes. Iconic reusable tumblers are offered at various festivals throughout the year to bolster the reusable mug aspect of the challenge. Though BU does not explicitly have a mug-share program, the competition aspect is unique and is an event where students draw other students into participating, increasing the spread of the program across campus.

Currently, the UBC Mug-share Pilot is only the mug-share program, a similar competition could be drafted with mug-share to bolster the population of students currently enrolled in the program.



Figure 1: The reusable tumbler currently offered at Boston University

Source: <http://www.bu.edu/sustainability/files/2012/11/12-5869-COFFEEMUG-019.jpg>

3.0 TBL analyses

A TBL analysis is used as a comprehensive way of measuring products based on environmental, social and economic criteria.

Currently the demand for disposable paper cups is staggeringly high: Starbucks alone requires 1.9 billion paper cups annually (Anderson, 2006). Overall, Americans use an average of 23 billion paper cups annually. A large scale switch to reusable to-go mugs of any material would lower this demand substantially if the mugs are used correctly.

3.1 Mug Type #1: Milano Tumbler

This is the current mug in circulation in the program. It is 14 oz., which is in between the average small and medium sizes available at most cafes. It is a matte gray color, and currently has a sticker on it which depicts a logo.

3.1.1 Environmental Considerations

One of the largest concerns of the environmental community when considering an increased use of stainless steel is the carbon dioxide emissions from stainless steel production. The International Stainless Steel Forum even quantifies it as being 2.90 tons of CO₂ for every 1 ton of stainless steel produced (International Stainless Steel Forum, 2015). With this in mind, however, it is important to consider the reusability of the stainless steel mug. One reusable stainless steel mug is intended to take the place of several years of disposable paper cups. The break-even point on a stainless steel mug is 24 uses.

3.1.2 Social Considerations

The social implications of using a to-go mug are difficult to qualify. The lack of a corporate logo, cleaning and durability are all factors to consider that have social implications. This mug currently has a sticker logo, but there is the potential of further advertisements being used on the cups. This mug specifically has a rubber bottom that does not stand up in the industrial dishwasher, which contributes to the overall durability of the mug. Relating specifically to stainless steel, the prolific amount of metal to-go mugs (Figure 1) seen on UBC campus is testament to their trendiness.



Figure 2: The Contigo travel mug is a popular to-go mug, especially considering how durable it is, how well it retains heat, and it's easy to use lid

Source: <http://mochadad.com/app/uploads/2015/06/contigo-travel-mug.jpg>

Furthermore, as a thought experiment: does an empty stainless steel to-go mug from 3 days ago have an aesthetic appeal not shared by a paper coffee cup of similar neglect?

3.1.3 Economic Considerations

The economics of using the Milano Tumbler are favourable for the participant of the mug share program. At a \$5 dollar deposit for a mug that cost the program \$11, the benefits for the consumer are made purposefully high to encourage participation. This is a reason for financial concern should many mugs become unaccounted for. The program is not meant to be profitable but economic considerations are important.

Stainless steel is a resilient material and therefore is a good choice when seeking to avoid damage due to being dropped. The strength of the material will directly affect the amount of mugs that need to be replaced thus saving the mug-share program money. For example, plastic mugs do not have this same impact resistance and thus would require replacement more often, if used. One stipulation of the use of a stainless steel mug is that they tend to be more expensive than their plastic counterparts. An area to be concerned with should the program expand to the point of requiring more stock.

3.2 Mug Type #2: Corn Plastic

This mug presents an uncommon alternative to stainless steel, glass, plastic or ceramic to-go mugs. Corn Plastic is a relatively new material, in terms of being commercially manufactured into consumer products. There is also the potential of having a logo put onto this mug, it would depend on the manufacturer chosen.

3.2.1 Environmental Considerations

Corn Plastic is initially made from a resin of corn called Polylactic Acid (PLA). PLA is a renewable material as it is made from corn as opposed to petrochemicals like conventional plastics (Royte, 2006). A mug made from corn plastic reduces the need for disposable paper cups as the mug can be multi-use. Despite this, corn plastic mugs will be disposed of eventually and it is therefore necessary to consider their disposal details. Corn Plastic will not emit toxic fumes when incinerated, unlike conventional plastic. PLA is regarded as biodegradable by GreenHome (EcoCorn Travel Mug, 2016). According to Smithsonian writer Elizabeth Royte, however, while it is technically true to say that the corn plastic is biodegradable, it is only under conditions that are not normally found in the average garden (there being a difference between biodegradable and compostable). The conditions include 140 degrees Fahrenheit and a continuous flow of microbes that require fresh oxygen. Without these conditions, corn plastic could take anywhere from 100 – 1000 years to decompose. This means that this mug would require special care when disposed of, and could not be composted by conventional means.

3.2.2 Social Considerations

The social impacts of using a corn plastic mug are difficult to quantify. A large scale reduction in oil demand would mean a global change in economics, conflicts and politics. Of course, the switch to using a corn plastic mug for this mug-share program at UBC would have no effect on the global oil demand and therefore we must consider only immediate social effects. The use of a reusable mug does mean that the mug would be required to be cleaned. This can be inconvenient and tedious for the consumer resulting in the continued use of paper disposable cups as an alternative to cleaning the mug. Large beverage companies take special care into designing their disposable coffee cups. Without a doubt, an aversion to a franchise's logo paper cup would incentivize a franchise to provide their own to go mug that includes the corporate logo.

Finally, as with any to go mug, a consumer may feel burdened with it on them at all times. The convenience of a disposable paper cup is unparalleled in this sense. As with any to-go mug design, corn plastic or otherwise, special care should be put into its ergonomics. In this way, the mug's ease of use is maximized thus mitigating the inconvenience of carrying around a to-go

mug. A practical result of choosing corn plastic over another material such as ceramics or paper, however, is considering the mugs durability. It is undesirable to have a to-go mug that is susceptible to massive damage when dropped, for example. The corn plastic's strength is comparable to regular hard plastic found in to-go mugs.

3.2.3 Economic Considerations

The economics of interest will be twofold. The large scale economics involved when considering the switch from petrochemicals to corn will be considered to give a big-picture perspective, and the more observable economic impacts of the individual consumer on the UBC campus will also be considered. A swap from petrochemicals to corn means a change in where money is invested. It is possible that a massive swap to corn plastic would increase the cost of corn. Because large amounts of corn are required, yields must be high. This in turn supports the high yields that are provided by GMO corn. While money being spent that supports GMO foods isn't inherently bad, it is controversial and is something that consumers may want to know.

Concerning the UBC mug-share program specifically, buying corn plastic mugs is comparable to stainless steel to-go mugs (depending on the mug). One example of this is the, GreenHome 16 oz. travel mug priced at \$16.50 USD (GreenHome Travel Mug, 2016). Similar sized, conventional, plastic mugs can be found on Amazon typically priced between \$11.00 to \$20.00 USD. What remains undetermined is if there are significant savings available for buying in bulk from the corn plastic producer. This has been a benefit for the mug-share program at UBC as the to-go mug stock has been purchased in bulk from the UVic. Currently, the cost for each stainless steel mug is \$11.00: significantly cheaper than the corn plastic mug being advertised. For consumers, the price increase caused from using corn plastic may be reflected in the cost of the deposit.

An important consideration if choosing corn plastic is to consider the mug's resilience when washed in high temperature dish washers. An experiment was run on a corn plastic mug: the mug was put through a home dishwasher (assumed to be less intense than a cafe's dishwasher). After 16 runs through, there has been no major degradation of the material as seen in Figure 2:



Figure 3: Straight on view of a corn plastic mug that has been put through a home dishwasher 16 times

Source: Taken by Duane Evans

Additionally, it is important to note that on the bottom of the mug it is printed “Hand Wash Only”. Although there are no signs of major or immediate damage after 16 runs, it is still possible that the mug’s life-time has been reduced. It remains to be determined if all corn plastic mugs have this weakness. Furthermore, the dishwashers found in the participating cafes at UBC are of a higher intensity. Without further experimentation it is impossible to say what damage a corn plastic mug would incur at these higher temperatures.

3.3 Mug Type #3: “Joco” Glass Mug

This 16 oz. glass mug is a great option because it’s so durable. Additionally, because it is made of a borosilicate glass it is incredibly heat resistant, which means that it will stand up to being washed in the industrial dishwashers

3.3.1 Environmental Considerations

Eventually, the environmental impact of creating the mug is ‘mitigated’; this is known as the breakeven point. The breakeven point relative to paper cups, is seventeen uses (Hocking, 1994). This analysis also considers the energy required to wash the mug after each use.

Table 1: Break-even matrix as determined by Hocking, Professor at the University of Victoria (1994)

Reusable Cup	Disposable Cup	
	Paper	Foam
Ceramic	39	1006
Plastic	17	450
Glass	15	393

Most recycling facilities will recycle typical ‘soda-lime-silica’ glass, such as glass bottles or mason jars. However, this mug is not made from typical glass, instead it is manufactured using ‘borosilicate’ glass, which is the same type of glass that can be found in Pyrex. This means that the glass cannot be recycled once broken, it must be thrown out. However, this type of glass is incredibly durable, due to the addition of boron in the glass. This also increases the mugs durability, and prevents it breaking when dropped. Additionally, it may be possible to dispose of these mugs through the Risk Management Program (RMS) on campus. Most lab glassware is manufactured using borosilicate glass as well.

3.3.2 Social Considerations

Once again, the social impacts of reusable mugs is difficult to qualify. However, this mug has a small benefit over the other mugs in that the silica sleeve seen on the outside of the mug is customizable.



Figure 4: The 16 oz. version of the “Joco” Mug. The silicon sleeves are made in many different colors, which is an opportunity for customization

Source: <https://jococups.com/product-tag/16oz/>

This could perhaps be an area for advertising, or for personalization of the mug to the user. In reviews online, the lid is highly rated, which would reduce the complexity required and encourage use. Also the silica sleeve allows for heat retention while not being too hot to hold, which is another benefit for the user. As with the other mugs mentioned, there is also the added burden of carrying around a dirty mug for the remainder of the day. Overall, this is a very user-friendly mug.

3.3.3. Economic Considerations

The price for the 16 oz. is \$24.99 (Amazon). Therefore, a larger initial deposit would be required for this mug, as would additional financial penalties incur, in order to alleviate the start-up costs and to prevent the loss of money due to theft. Another thing to consider, is the increased durability will allow these mugs to last longer than the Milano Stainless Steel Tumbler or the Corn Plastic mug.

4.0 Solutions to the Monitoring and Tracking of Mugs

While there are various ways in which the mugs could be tracked by the coffee shops, a technological approach, although more costly, seems significantly more fitting and convenient.

4.1 Description of Umbrella Sharing Service

More specifically, the team in charge of the mug-share project could implement a system similar to the one being used in the Umbrella Sharing Service around campus. The Umbrella Sharing Service was founded by UmbraCity and partnered with UBC's Alma Mater Society in order to bring to the UBC campus a program in which people can check-out umbrellas when needed and return them in a timely manner.

UmbraCity's program was launched on campus around September of 2015, and has been rather successful thus far. All students are eligible for this program but they must first sign up online by providing name, student card number, and credit card information. The umbrellas are stored in "kiosks" found around campus and these kiosks allow students to take an umbrella by first swiping the card reader free of charge. The customer then has a 48 hour period to return it, after which he/she will get charged 2\$ per each day of not returning the umbrella up to a maximum of 20\$ (Enterazi & Asad, 2013)

4.2 Technological Mug-share Tracking System

In terms of the mug-share program, Sprouts, Seedlings and Agora cafes could have similar kiosks that hold the mugs, at their respective locations. Enrollment into the program is \$5

which can be paid online or in person, and the following is a description of the payment methods available to the users:

Table 2: Possible Payment Methods for Mug-share Registration

USER	PROVIDE ONE OF THE FOLLOWING	
	OPTION 1	OPTION 2
STUDENT	UBC Card Number	Sign up using Credit Card
FACULTY/STAFF	UBC Card Number	
GUEST	UBC Guest Card Number	

Moreover, the system would work similarly in that the user would have a 4 day period to return the mug. For example, if they checked the mug out on a Monday at 9am, they would have to return it by Friday at 9am. For every day that they exceed their time limit, clients will be charged \$2 up to a maximum of \$6 (or 3 days), which ultimately covers the current price of the mugs (\$11). This daily fee may be adjusted according to the new prices of the mugs.

It is important to note, however, that the technology used in the Umbrella Sharing Service was developed by UmbraCity, and unless re-developed, must be accessed by the Mug-share coordinators with permission from the Alma Mater Society (AMS) (who are partnered with UmbraCity).

Furthermore, following talks with Alison Fung (Mug-Share Coordinator), it is important to take into account the fact that Agora Cafe has no computers available and thus such a technological tracking system would be difficult to implement and thus a non-technological alternative must be considered.

4.3 Non-technical Mug-share Tracking System

Granted the size of the cafes in which the Mug-share program is being implemented, and the fact that they are student-ran, a less complicated and costly approach must be considered.

A non-technical approach to tracking mugs would be to either increase the deposit upon registration or request some sort of collateral. For example, customers would, upon checking out a mug, sign a sheet with their UBC Card number and deposit \$10. These \$10 will then be returned to the users upon checking the mugs back in. The users will have a 14 day period to return their mugs, at which point they will be unregistered from the Mug-share program and only a total of \$5 can be refunded upon returning the mug.

4.4 Recommendations

In order to decide which system is better suited for the current mug-share program, it is important to assess the cost of the different systems, the feasibility of implementation, and the effectiveness of each system.

4.4.1 Summary of the Technical Approach

In terms of cost, it is *expensive* not only to implement the technology, but also to build the automated 'kiosks' that will hold the mugs and open upon customers swiping their UBC Cards. This approach, given the circumstances and budget of the current mug-share program, is *not that feasible* since it requires collaboration from either the AMS or UmbraCity to obtain the tracking program. The *effectiveness* of this method is what makes it stand out. Through this method, all mugs are tracked perfectly within a computerized system, and the coordinators can monitor, at all times, the inventory of mugs that are available, instead of having to count. This system also makes the payment methods more effective and accessible to users.

4.4.2 Summary of the Non-Technical Approach

This option is very *inexpensive*, as it only requires a sign-up sheet as well as a sheet to keep track of checked-out and returned mugs. It could be implemented and planned out within a day, and initiated almost immediately after, making this approach *very feasible*. It is *effective at a small scale*, but would get complicated if the number of people signed-up gets too large. It requires more people as well as more attention to keep track of the sign-ups, check-ins, and check-outs.

4.4.3 Conclusion

Therefore, taking the aforementioned aspects into consideration, the non-technological approach is ideal for the current mug-share program since it is being implemented in cafes that are not only less popular, but are also student-ran and do not have as big a budget as those cafes associated with UBC Food Services. If the Mug-Share program was to expand into coffee shops operated by the AMS, UBC Food Services, or bigger brands such as Tim Hortons or Starbucks, then a technological approach would without a doubt be the more convenient approach.

5.0 Conclusion

In conclusion, there are options that have yet to be considered that could be implemented so as to bring in more clients. These include: customizable “Paint Your Own Mug” or “Join the Challenge” competitions. Other mug-share or sustainability programs have corporate partners, and this would also be an area that should be further investigated, such as partners to donate mugs or help promote awareness. The biggest problem will be awareness going forward.

In terms of mug options, though corn plastic is a new and interesting material, at this time it is too new to be able to implement. Economically, staying with the Milano Stainless Steel Tumbler is the best option at this time. However, moving forward the Joco 16 oz. mug would be a better option in terms of durability and aesthetic appeal.

The non-technical approach is ideal for the current mug-share program since it is being implemented in small cafes. If the mug-share program was to expand into coffee shops operated by the AMS, UBC Food Services, or bigger brands such as Tim Hortons or Starbucks, then a technical approach would without a doubt be the more convenient approach.

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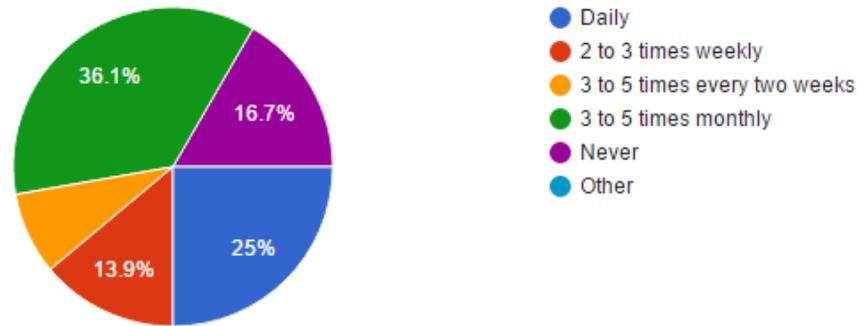
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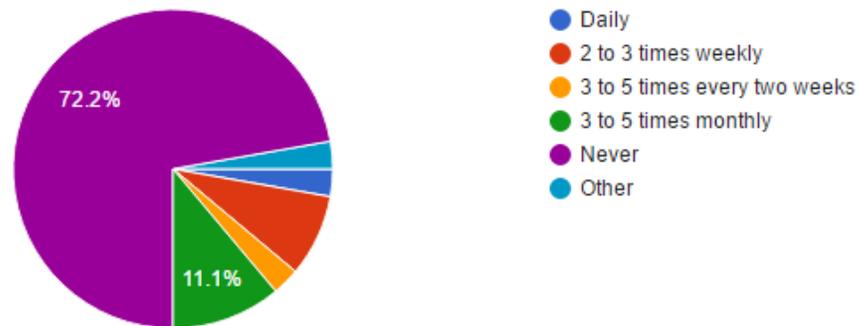
Appendix A

The following data was collected through a survey that was posted to the 'UBC Class of 2018', 'UBC Class of 2019', and the 'UBC Engineering' Facebook groups. It should be noted that this is approximately a sample population of 30,000 with only 36 responses received. This means that 0.12% of the sample population responded. Additionally, those who did respond are the type of people who would be interested in the Mug-Share program, as the title of the survey was 'UBC Mug-Share Pilot Project', thus there is a bias in the data received.

How often do you purchase coffee/tea etc. and get a paper cup? (36 responses)

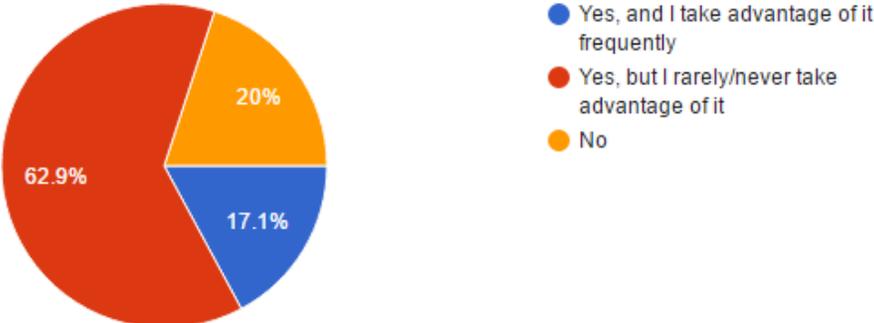


How often do you purchase coffee/tea etc. using a reusable mug? (36 responses)



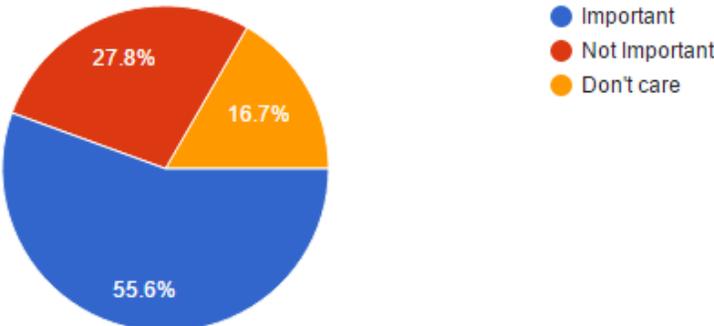
Are you aware that some coffee places offer discounts for using a reusable mug?

(35 responses)

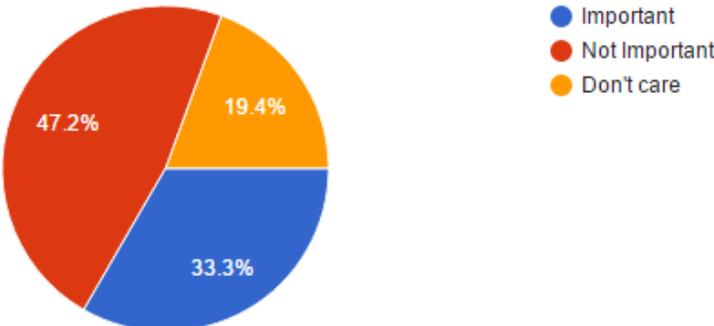


How important is the economic incentive (i.e. discount each time you bring your own mug)?

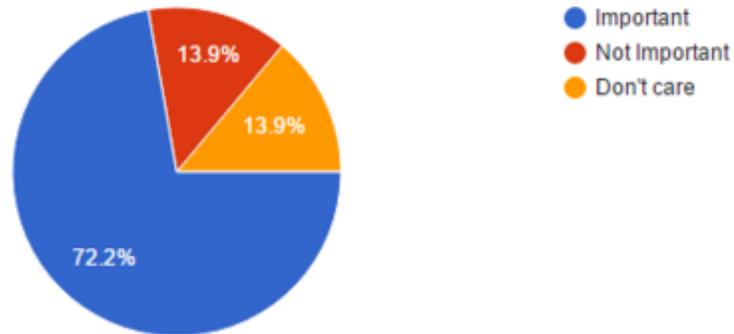
(36 responses)



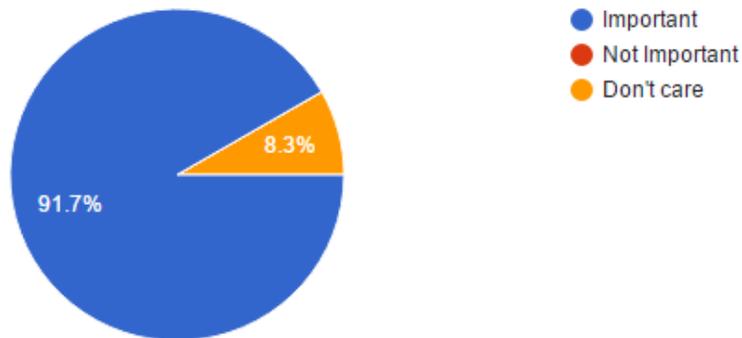
How important is the aesthetic factor (i.e. how the mug looks)? (36 responses)



How important is having a mug that retains heat well? (36 responses)



How important is having a mug with a lid? (36 responses)



How important is reducing environmental impact by using a reusable mug? (36 responses)

