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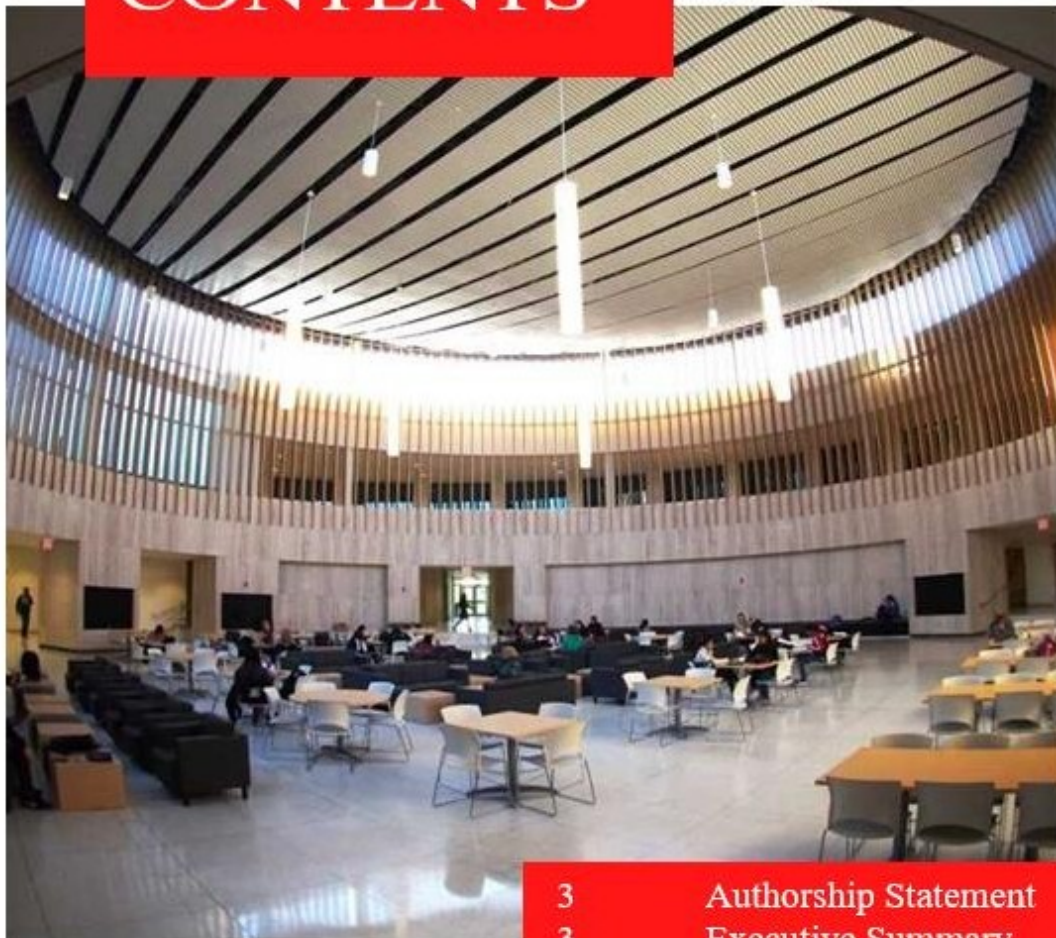
FEASIBILITY REPORT

ORGANIC WASTE REDUCTION

UNIVERSITY OF TORONTO
MISSISSAUGA.

ENV332: PRACTICUM IN ENVIRONMENTAL
MANAGEMENT.

TABLE OF CONTENTS



| | |
|---------|----------------------|
| 3 | Authorship Statement |
| 3 | Executive Summary |
| 4 | Introduction |
| 5 | Background |
| 6 | Information |
| 6 | Problem Statement |
| 6 - 7 | Methods |
| 7 - 10 | Findings |
| 10 - 11 | Recommendations |
| 11 - 12 | Report Conclusion |
| 13 | References |

EXECUTIVE SUMMARY

The aim of this project is to research and propose a choice of recommendations to reduce the volume of organic food waste generated at the University of Toronto – Mississauga (UTM) campus. Organic waste persists as an issue on both the institutional and provincial level, to which the province and several post-secondary institutions have responded with a variety of means to divert it. UTM currently does not have any program to deal with the organic waste produced by consumers on campus. For this reason, our research has been focused on finding the appropriate means that apply the principle of a circular economy through prevention or reduction, recovery and recycling. Our data collection process consisted of communicating with each stakeholder of the issue, conducting a secondary research of existing sources on the same topic as well as consulting other institutions. We have found that preventing and recovering organic waste can be facilitated through means such as using a surplus-food matching application to prevent wasted food, donating to food banks, providing organics bins, using reusable containers and promoting awareness and education of students on diverting organic waste. Recycling organic waste can be achieved by investing in a biodigester that converts the waste into compost or biofuel or partnering with local farms and organizations that can use the organic waste for their benefit such as food for their livestock or compost for land. Based on our compiled findings, the following recommendations have been decided as the best forms of action for UTM to undertake. The first is for UTM to provide compost bins all over campus in order to properly dispose of organic waste and separate it from other forms of waste. Our second recommendation is to promote awareness and education on organic waste prevention and reduction for students through a variety of means such as posters and workshops. Thirdly, we recommend that the university partner with biofuel companies to take our food and organic waste to be converted into biofuel, that way organic waste will be both recycled and turned into profit. Our final recommendation for UTM is to work with IT and computer science graduates from UofT to create a free app designed to prevent and reduce organic waste on campus by notifying locals about food that is in surplus. These recommendations have been suggested as the most feasible means of reducing organic waste at UTM, thus bringing the institution one step closer to becoming a greener campus.



INTRODUCTION

Organic waste is any biodegradable material sourced from an animal or plant. It can be produced during the processing of a product before it reaches the consumer, known as pre-consumer waste, or after a product is consumed or used by a consumer, which is post-consumer waste. Reducing organic waste can help preserve natural resources in a sustainable manner. It also contributes to a healthy growing economy while ensuring that all Canadians are well nourished. In 2015, organic waste in Ontario alone exceeded 3.7 million tonnes, and a large percentage of this waste is considered to be avoidable (Second Harvest, 2019) (see Figure 1.). As a matter of fact, consumers are responsible for approximately 47% of the organic waste produced (Second Harvest, 2019). Further, according to recent estimates by Second Harvest, where organic waste costs Canadians close to %2 of the annual GDP.

Similarly, this behavior has been adopted by the UTM community, which is why steps have already been taken towards addressing this issue. The installation of a dewaterer and a macerator in the Colman Commons building and the Davis building have already decreased approximately 50% of the pre-consumer waste produced, through a process called hydrolysis. The problems arise when dealing with post-consumer waste, which makes up the vast majority of the waste here on campus. There are currently no organic waste programs aimed at dealing with this issue. My peers and I have been tasked with finding a sustainable approach towards limiting the tonnage of organic waste here on campus.

We have been working and communicating regularly with stakeholders through in-person meetings and emails with facilities including the Sustainability Office, Retail & Hospitality Services, UTMSU and Peel Region Waste management. Moreover, we have consulted other institutions, scientific literature, and government-sponsored organizations in order to find a feasible and implementable approach given the socio-economic conditions of our campus. Some of the limitations that we had to overcome were those relating to the scarcity of quantitative data regarding UTM's organic waste. There are currently no organic waste reduction programs on campus so there are no fallbacks or any solid foundation for which to base this project on and improve. As a result, findings from various research articles were key in offering my team and I a list of possible methods to tackling this issue of organic waste reduction. These options include the donation of excess food to food banks and local charities, investment in a composting program, and the assembly of a "food task force" whose job would be to educate the public and oversee the initiation of various workshops across campus aimed at educating students on disposal strategies.



BACKGROUND INFORMATION

The reduction of organic waste builds upon the sustainable principle of a “circular” economy, in which resources and materials are continually circulated for as long and efficiently as possible in the economy through waste reduction and prevention and resource recovery and recycling (Region of Peel, 2018, p. 3). The recommendations in this paper are solutions based on this principle along with secondary research of these solutions in practice.

On a provincial level, Ontario households in Southern Ontario have disposed of an average of 2.4kg of food waste per week in the garbage, comprising 35.4% of the waste stream, not including waste that was disposed of in green bins (Werf et al., 2018, p. 5). The rate was higher for urban households than rural households, however, households with access to a green bin wasted significantly less food than those without a bin (Werf et al., 2018, p. 6). The current system of the Peel Region for dealing with organic waste is curbside and multi-residential collection of organic waste from local neighbourhoods in order to reduce post-consumer organic waste (Region of Peel, 2018, p.9). The organic waste is properly disposed of and then sent to processing facilities to be turned into compost to be used for soil amendment (Region of Peel, 2018, p.9).

The provincial government issued the Food and Organic Waste Policy Statement under section 11 of the Resource Recovery and Circular Economy Act, 2016, which provides policy direction to reduce waste and recover resources from organic waste (Government of Ontario, 2018, p.4). The provincial vision of the statement is focused on a circular economy through the effective prevention and reduction of organic waste, the collection and processing of waste, and the reintegration of resources from food and organic waste back into the economy (Government of Ontario, 2018, p. 4). The statement includes their aim to promote education on organic waste to encourage a change in behavior to prevent and reduce food waste and recommend that municipalities develop their own programs to educate the public at reducing food waste (Government of Ontario, 2018, p. 13). It has also set the sector-specific goal for post-secondary institutions to achieve 70% waste reduction resource recovery of organic waste produced by 2025 (Government of Ontario, 2018, p.13)

The excess production of post-consumer waste is not an issue unique to UTM. Other post-secondary institutions have already undertaken initiatives to reduce organic waste or compiled reports on sustainability focused on reduction of waste produced on campus. In the St. George campus of the University of Toronto, there are 32 green bins in total available in the dining halls and cafeterias of residence buildings to properly dispose of organic waste, and pre-consumer waste is collected from campus kitchens for later processing (University of Toronto, 2016). McMaster University has established a Waste Reduction Plan that consists of an audit on the amount of solid non-hazardous waste produced on campus followed by their recommendations to prevent and reduce waste. Organic waste made up 24.3% of their waste stream but experienced an approximate 25% reduction in organic waste from 2017 to 2018, which was attributed to the success of an organics program that is already in place on campus (McMaster University, 2018, p. 5). The report recommended that the school can further benefit by expanding its existing composting program, improving collection systems and better education programs on organic waste (McMaster University, 2018, p. 16). Reports such as these and examples of programs at other universities can be used to guide UTM in its organic waste reduction initiatives.



PROBLEM STATEMENT

The issue at hand is that there is a continuous production of organic waste at UTM without any coherent system in place to deal with it. Post-consumer organic waste continues to be improperly disposed of, despite the material being biodegradable and compostable. Due to the unavailability of hard data, the amount of organic waste produced from campus facilities is unknown. Likewise, there are no reports on sustainability, and we have also experienced difficulty obtaining information from stakeholders from UTM. The difficulty to access this type of data demonstrates the lack of foundation UTM is able to ground itself on any future actions towards reducing organic waste. Sustainability reports such as the example by McMaster University, as well as examples of programs at other universities, can be used to offer recommendations to guide UTM in its organic waste reduction initiatives.

METHODS

To determine if the University of Toronto Mississauga is able to implement strategies to reduce the amount of organic waste on campus, we have had interviews and meetings with our stakeholders. To date, we have communicated with our stakeholders through in-person meetings and sent emails to facilities including the Sustainability Office, Retail & Hospitality Services, UTMSU and Peel Region Waste management. The meetings involved questions about the waste disposal system on campus and current problems related to maintaining organic waste on campus. There was a specific set of questions asked during the interview, but the interviewees were not restricted to answering those specific set of questions. Stakeholders were also asked to provide any available information regarding the pre-consumer and post-consumer waste which was not available. Although some of our stakeholders were unresponsive, we looked at other online journals and websites to gather information about organic waste management on campus.



Figure 1: Example of the new waste bins that UTM has implemented in the student center.

At UTM Front-of-house organic waste is not composted in most areas. Most of the bins are not outfitted with a space for organic waste. They are working to rectify this and should have new bins in place later this year. Back-of-house organic waste (from the kitchens) is composted. Yard Waste is also composted. Oscar Peterson Hall has organics diversion in place in the cafeteria. UTM is working towards rolling out compost for food service areas on campus, but this takes time since UTM needs to modify all the bins to have an extra slot for organic waste. As of 2013, UTM has banned selling plastic bottles and has installed 20 new fountains around campus. UTM has also partnered with Ontario Electronic Stewardship to recycle campus waste electrical and electronic equipment. There is also Inkjet and toner cartridge recycling program which allows for the collection of these boxes around campus for students, staff and faculty to use and dispose of their empty printer cartridges. These items are then picked up and sent for recycling. UTM currently has new bins in the student center as shown in Figure 2 of the appendix (Sustainability Office, n.d.).

FINDINGS

Many initiatives have been consulted by journal articles and reports, mostly all falling under three domains that include preventing, recovering and recycling organic waste as proposed by National Zero Waste Council or (NZWC, 2018). The hierarchy has been adopted by many universities and cities, therefore UTM should adopt a food waste pyramid thinking as seen in the appendix below to address organic food reduction.

The top priority for UTM includes preventing generation of organic food waste. With already measures taken to reduce organic waste in the UTM kitchens, organic waste is still a concern as waste is generated from other sources. The second priority includes recovering organic waste for people. The last goal is to reduce organic waste formation by recycling the waste into other forms of sustainable resources. The goals are explained below with initiatives which can be undertaken to reduce organic waste at UTM.

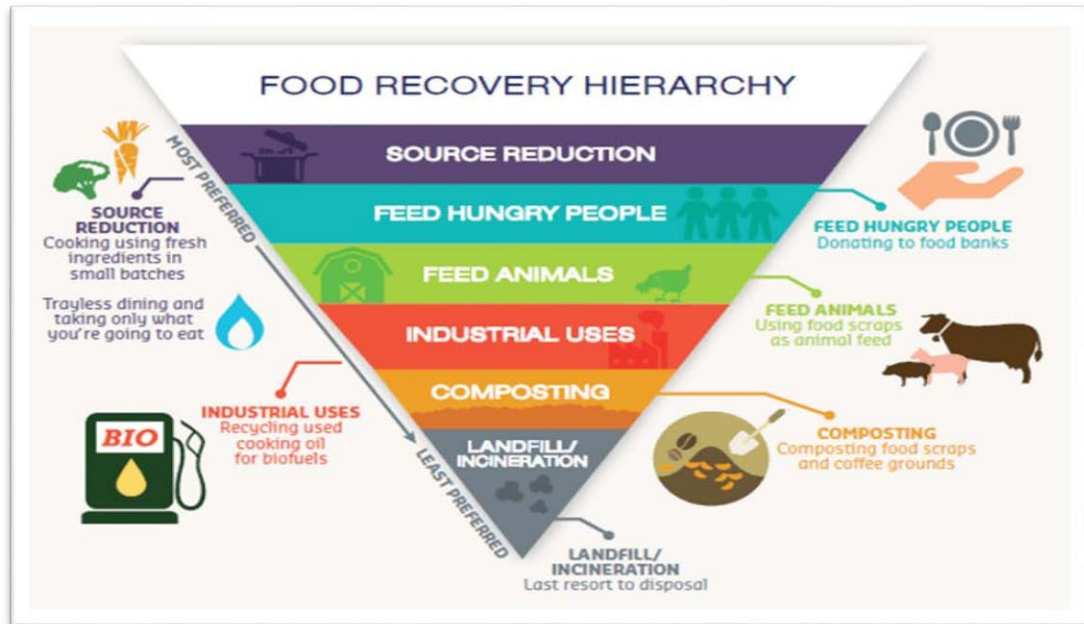


Figure 2: Diagram of Food Recovery Hierarchy as addressed by the Commission for Environmental Cooperation

PREVENT & RECOVER

Preventing organic waste formation is crucially important as it has social, economical and environmental benefits. Reducing organic food waste is important socially as it eliminates food insecurity and hunger, achieving Sustainable Development Goals (SDGs) as a community. Economically, reducing food waste lowers the costs associated with obtaining food and reduced disposal costs by the university. Environmentally, reducing food waste is important as it decreases the ecological footprint, Greenhouse gases (GHGs) and carbon dioxide (CO₂) output on campus.

The means of reducing food waste includes creating surplus-food matching service application as suggested by Evans-Cowley and Arroyo-Rodriguez (2013). The application can be a website or an app on mobile which links wasteful food to potential eaters on campus. The app notifies the hungry consumers of available food that is likely to be wasted from the kitchen or restaurant. Or the kitchen or restaurant can advertise food items which are going to waste (Commission for Environmental Cooperation, 2013). The aim of the app is to prevent food waste from occurring on campus. Additional initiatives as suggested by Commission for Environmental Cooperation or CEC (2013) include reducing portion sizes, placing date and ingredients labels so the consumers are informed of components of food items. This is a benefit as consumers will purchase their items knowingly by reading the label (Commission for Environmental Cooperation, 2013).

Socially, means of reducing organic food waste is by donating it to university's local food banks and food insecure individuals on campuses (CEC, 2013). According to City of Toronto (2019), 18.5% of its population are food insecure, and food insecurity negatively affects the emotional, mental and physical well-being of an individual. By donating some of the food, it is possible to reduce food insecurity on campus.



Figure 3: Example of signage and colored bins used by University of British Columbia (UBC).

Additionally, the University of Toronto Scarborough Campus (UTSC) which is similar in size as UTM have placed initiatives to reduce the organic waste on campus. In the 2018 of the UTSC waste audit report, it mentions that only organics represented 46.11% of waste generated. Organics represented 57.58% of waste to landfill. Organic contamination represented 74.46% of the contamination in the mixed recycling stream. They have some initiatives that they have implemented to reduce the organic waste on campus. Some of the initiatives include a reusable coffee cup program, common waste and recycling containers with signs, an organic program to include a food court area and implementing a waste tracking system to monitor the amount of waste and recycling that is removed from the facility. The reusable coffee cup program encourages the reduction of disposable coffee cup use and reduces the number of coffee cups sent to landfill. Having more waste and recycling containers with signs will help people sort out their waste and improve diversion rates to landfills. Also, they have a waste tracking system that will help track how much waste is generated. Most importantly, educating people about the different programs and creating awareness can help make a big difference (University of Toronto Scarborough, 2018).

| <u>Organizations</u> | <u>Location</u> | <u>Conversion</u> |
|--------------------------------------|-----------------|---|
| SunOpta | Brampton | Biofuel |
| Woodland Biofuels | Toronto | Ethanol (Biofuel) |
| Methes Biofuels International | Mississauga | Biofuel |
| Wastenotfarms | Toronto | Compost |
| Karma Co-op | Toronto | Divert organic waste to local farms for animal feed |



RECYCLE

Organic waste can be recycled into other components such as compost or biofuel, however UTM lacks technology needed to do this. The first option is to invest into a biodigester which forms organic waste into compost that can be used on the campus. However, it is expensive and requires establishment of four-bin waste stations to be implemented all over the campus. The collected organic waste from the kitchen and over the campus then, can be placed in the biodigester (Schmeider, 2012).

Another initiative involves UTM reaching out to the local farms and organizations which are able to employ the organic waste to their benefit. This includes feeding the organic waste to the animals, additional means of composting or conversion of organic waste to biofuels (Närvänen et al., 2019). Below, is a compiled list of organizations located within the Greater Toronto Area or GTA that converts organic waste into sustainable resources. Contacting these organizations is up to the stakeholder's interest.

There are no monetary incentives with the placement of different sorting bins. Instead, people can receive social incentive by contributing to corporate social responsibility by sorting their waste.

RECOMMENDATIONS

Reducing organic waste on campus is a major feat that requires the efforts of stakeholders, faculty and students involved. Currently, the UTMSU and the Sustainability Office do not have data on organic waste production on campus from retail services and consumers. The UTMSU sustainability representative reported that currently no company diverts organic waste from the campus.

We recommend the UTMSU, and sustainability offices to install organic waste bins on campus for post consumers to dispose of foods. Therefore, post consumers can divert organic waste from other wastes, which can limit the contamination of recyclables. Organic waste bins saw some success in separation of organic waste at the University of Toronto Scarborough campus. They found that organic waste was being diverted from other wastes, however contamination did occur between wastes. We suggest our client implement waste separation bins similar to the system in the University of British Columbia. Organic waste separation in UBC has shown to be effective in diverting food from other waste. Organic waste bins should be recognizable to post consumers, so the color of the bins should be green with an organic waste label.



Secondly, we suggest students to be educated by the UTM faculty on organic waste prevention. Posters, signs, and billboards should have reminders of how pupils can reduce organic waste from organic products. The UTMSU, sustainability office, and other staff members can set up workshops to educate post consumers on preventing organic and food wastes. Our findings have shown educating consumers on prevention can reduce organic waste as a whole.

Thirdly, we suggest the University to partner with local companies that convert organic waste to biofuel. We found many organic energy conversion companies in the Greater Toronto Area such as Methes Biofuels International. Food waste diverted from the campus by the usage of organic waste bins can be converted to energy by these leading enterprises. We also suggest building composting sites on campus for biodegradation of organic waste. Composting can be set up in the greenhouses at UTM for maximum efficiency. Therefore, the campus can reduce and profit from organic wastes.

Lastly, we recommend our client to work with IT and computer science graduates on campus to build an app to collect food items from post consumers. The university has the fiscal and technological capabilities to build a cheap and simple app to notify locals of potential wasted food items for pick up. We also recommend our client to receive food donations from all members on campus. Therefore, organic waste can be prevented or reduced on campus.

CONCLUSION

After connecting with each stakeholder and obtaining valuable information along with a review of existing literature, we narrowed it down to the reported findings that were used to guide our recommendations. As there were no sustainability reports nor any sort of coherent program on campus to deal with food and organic waste produced by consumers, we have had to extract data from examples of other institutions along with a literature review to model our findings. The findings from our data collection outline the following principles that other institutions abide by to reduce organic waste, which are to prevent, recover, and recycle materials. Based on these findings and actions taken by other institutions, we proposed four recommendations as the most ideal actions for UTM to undertake in order to reduce organic waste; to install organic waste bins on campus, to promote education and awareness about organic food waste reduction for the students on campus, for the university to work with local companies to effectively convert organic food waste to biofuel and lastly, to build an application with the help of UofT graduates to divert a surplus of food items to local consumers. Having no program in place to reduce post-consumer organic waste, UTM should follow any one of the recommendations that will ideally reduce the volume of food and organic waste on campus.



The anticipated next step would be to forward a proposal to the UTMSU and sustainability offices about any one or more of these recommendations. This will bring the issue of organic waste to their attention and make them consider going forward with any of these recommendations. Another appropriate next step we can suggest for UTM, as well as the University of Toronto as a whole, would be to compile a sustainability report that includes an audit on the exact amount of waste produced on campus. One of the largest barriers we've encountered in writing our report was finding any hard data on the waste produced at UofT, which is concerning considering the size and reputation of the institution. We believe it would be beneficial for UofT to partner with an organization to measure precisely how much waste is generated, followed by an outline of recommended actions to deal with this waste in one coherent report that is available for public viewing. This will offer UTM a more solid foundation for the creation and expansion of a program to reduce organic waste on campus.

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