The Future of Vending: Final Report

University of British Columbia

LFS 450: Land, Food and Community III

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Jonathon Centofanti, Katherine (Katie) Mack, Nataporn (Plum) Swangjit, Yolanda Wang

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Executive Summary

Vending machines are a fixture in many buildings across the University of British Columbia (UBC) campus. Student Housing and Hospitality Services (SHHS) was the community partner for this venture and communications were conducted through Victoria Wakefield and the Social Ecological Economic Development Studies (SEEDS) program. The goal of this project was to see what vending could look like across the UBC campus and specifically, what kind of vending options would be feasible instead of a mini-mart in the Vantage College Orchard Commons. This group conducted a survey with those research questions in mind. The survey was put through a pre-test to see what kinds of responses could be attained from open-ended questions to synthesize a list of possible options to promote creative thinking in the actual measured survey. The pre-test was given in an interview format to stimulate deeper thought about the options for vending across campus. Questions were modified before being distributed to the wider population. The goal for participants was fifty and forty-four were surveyed – the six that were asked to participate in the pre-test were not asked to participate in the final version for concern over biases. Results showed students were interested in seeing fresher and healthier options in vending at UBC and wanted more instant or ready-made options. They were also interested in seeing non-food essential items in vending machines; item ideas included: cold/flu medicine, shampoo, soap and various other items not currently available in vending. While several participants were interested in seeing fresher food choices, others were concerned about the safety of such items in vending machines and would be skeptical of purchasing them. Also, students want to see healthier options available for vending, but when ranked, it was the least important factor when selecting vending options. Overall recommendations include

implementing more energy efficient vending machines across campus and introducing a Shop24, or equivalent system, to Orchard Commons.

Abstract

Vending across university campuses has traditionally been seen as a method for dispensing beverages and convenience snack items when it is not feasible or inconvenient to go to a market or café. This Social Ecological Economic Development Studies (SEEDS) project investigates what students at the University of British Columbia (UBC) are using in vending machines on campus and what they would like to see vended in such machines under the dorm-life paradigm as well as the commuter student lens. One area this project investigated was the possibility for replacing a mini-mart in the Vantage College Orchard Commons with a vending option, while the other area focused on the campus in its entirety. These objectives were researched by creating a survey for students to fill out online or in person that investigated students desires to see different types of food and beverage options in vending and also to see what types of essential items they might be interested in purchasing from vending. A pre-test was included in the methodology for creating the survey to ensure adequate depth to the questions and that surveys would take approximately five minutes to fill out. Forty-four surveys were collected for analysis and results showed students at UBC were interested in vending items outside of the standard beverages and convenience food items. Students that considered the residence experience were more interested in seeing non-food items including cold/flu medicines, shampoo and various other non-food items. Some students wanted to see healthier, fresh options, but the opinions were split between wanting to see the fresh options and not being able to trust the safety of such items. It is the recommendation of this report to further investigate

systems such as Shop24 and implement one of those vending options that includes non-food options and more fresh options.

Introduction

Vending is developing around the world to include more than the standard beverage and convenience snack foods. The objective for this project was to determine what types of products students at UBC would like to see in vending across campus and in residence living. The residence of interest is the new Vantage College Orchard Commons. The Student Housing and Hospitality Services office, specifically Victoria Wakefield, was the community partner for this project. One option that was put forward for our vending consideration was a Shop24 system (see appendix A). The possibility for vending options are countless and incredibly unique, such options around the world include live crabs, hair extensions, crack pipe and freshly made pizza (Storm 2014). Early brainstorming lead to visions of vending that allowed restaurants to vend day-old meals overnight to avoid food waste on campus. If that ideal could be further explored it could be a small, but important step in decreasing food waste across university campuses around the world and creating an even more sustainable food system. Without knowing if students on campus would be interested in such options, it would be difficult to implement immediately, which is why we chose to survey students for this stage of project development.

The vision statement for a sustainable UBC food system included eleven statements that would have to be met while meeting the current generation's needs without negatively impacting the food systems of future generations (UBC Food Systems Project, 2011). The research group agreed these were important considerations when striving for a fully sustainable food system. The only addition that could be included was from the Food, Nutrition and Health background to ensure that while the food system is sustainable, current and future generations should be

receiving adequate nutrition from their sustainable system. All members of the team value the overarching principles of sustainability which has been deeply ingrained through the years spent in faculty core-classes, and despite different paradigms based on choice of major and personal experiences, it was still easy to reach consensus.

Methods

This research was chosen to conduct through a community-based research (CBR) because the research is relevant to the UBC community as a whole, and their participation and opinions are valued (Minkler, 2005). This study was carried out in a community setting, and the methodology was set up to provide quantitative and qualitative data. Data was then collected through the survey online and in-person.

The purpose of the survey was to the get a general idea of what the students in UBC preferred to see in vending machines. The survey was also separated in two sub-topics: "Food & Beverages" and "Essentials" to follow the stated preference type (Carlsson, 2010). Questions in the "Food & Beverages" sections (Appendix B, questions 4-9) were designed to explore what food items students prefer, what they would like to see and how often they used vending machines in given circumstances. Questions in "Essentials" explored on the possibility of what necessities can be included and which group of students are the target customers (Appendix B, questions 10-12). Other questions with regard to what motivated people to use vending machines were also asked, such as convenience level, hunger level, cost and the healthiness of the food in vending machines. The survey was made under consideration that it would not take long to do, under 5 minutes; thus, the questions were mostly multiple choices and check all the applicable boxes questions. There were couple of open-ended questions to get more creative, out-of-the-box

ideas, but examples and notes for each question were included to help the participants brainstorm.

The survey was designed to target three types of participants. At the start of the survey, there were two preface questions (Appendix B, questions 1-2). Initially, it was planned to have the participants filled out the survey from the residence paradigm and/or from the commuter student paradigm depending on their responses to the first two questions. If they had experienced both scenarios, they would be asked to fill in the survey twice from both frames of references and their answers would have been counted twice – once from each perspective. However, the design was changed after a pre-test was conducted where most of the participants' (who appeared in both scenarios) answers only differed on the essentials category. That is why in the survey questions were included that asked if they wanted to see more vending machines that provided essentials considering the scenario they were in or used to be in (Appendix B, question 10-11). Other than the two preface questions, there was also a question that asked whether or not participants were international students. The reason behind this question was to see there was any additional or different material international students would want since one of the objectives was to see if there was any difference in preference of stock for international students compared to local students.

For the distribution of the survey, each member in the group went around to different locations in UBC and interviewed people. At the same time, the survey was also posted on an online platform and was promoted through personal Facebook pages. The survey took 5-10 minutes to answer depending on individuals. The survey was open for only 10 days (originally it was planned to stay open for 15 days) due to the survey being posted a little late. Using the sample size calculator, if we want our data to be statically significant our sample size should

have been 493 (Sample Size Calculator, 2015). However, due to limitations, the response rate for the survey was 44 participants. It should also be noted that during the interview there was a bias because participants tended to answer more in depth than in the online option. Nevertheless, the data and the information gained were significant for this research.

For the second part of the investigation, analysis of food purchased in residence mini-marts was obtained from the minimart manager. A meeting was set up with the manager and threes questions were asked: 1) what are the ten most popular items in terms of quantity? 2) What are the ten highest grossing items? 3) What are top items that students ask for the most that they do not provide? The purpose of this investigation was to gather information about items that were popular among first-year dorm students since it would be a good indicator as to what should be included in the vending machines.

Less than a month before the report had to be handed in, Victoria, the stakeholder referred the group, two people who were starting a business where they would put a vending machine that refills shampoo, body wash, and detergent in dorms. A meeting was conducted where qualitative information and future ideas were collected.

With regard to consent, every participant was informed of how the information would be used. Every participant who took part in the survey would remain anonymous or be properly cited.

Findings and Outcomes

A total of 44 students participated in this study. Out of the 44 participants, less than half of them (21) were international students. 15 students had lived both in dorm and off campus. 18 of the participants were dorm students and 11 were commuter students exclusively (Figure 1).

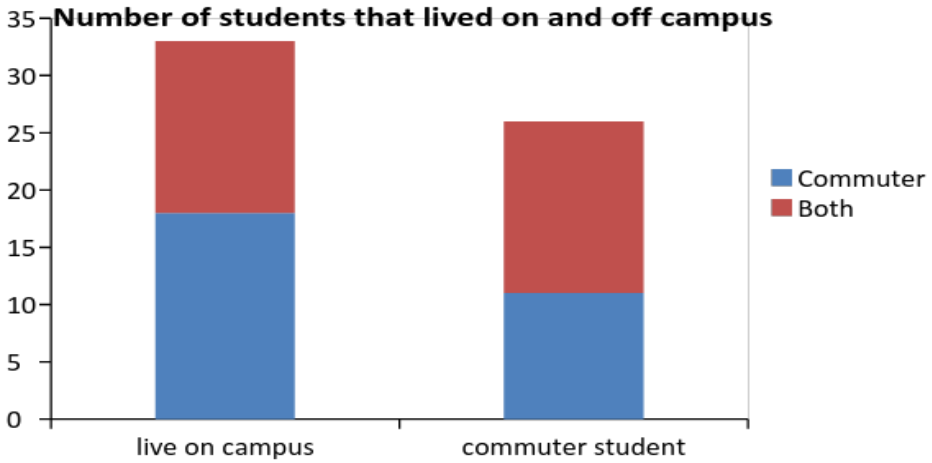


Figure 1 - Survey results of number of students that lived on campus and off campus.

The majority of the participants (68%) were infrequent vending users who used vending machines less than once a month. The rest 38% used vending at least once a month, and only 2 out of the 44 participants frequently utilized vending machines, representing only 4.5%. The majority of the students (63.6%) also responded that they used vending more often when they were studying on campus.

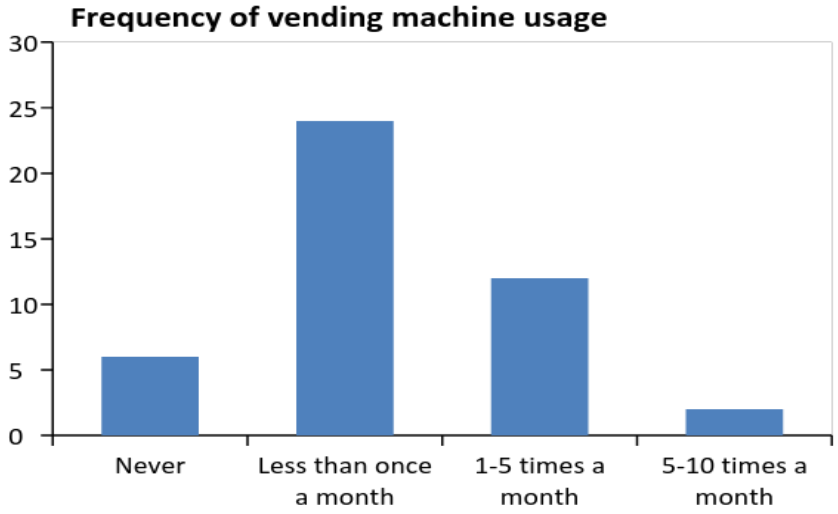


Figure 2 - Participants' self-reported frequency of using vending machines.

Chips, chocolate and soft drinks were the most frequently purchased vending items (Figure 3). Water and candy were also commonly purchased vending items, whereas gum and

granola bars which are the only "healthier" options were the least popular. Other items such as jerky and healthier foods are also mentioned by some of the participants as items they purchased. More than half of the participants (57%) responded that they would purchase freshly prepared food items from a vending machine, assuming there were appropriate date and ingredient labels. The rest (43%) would not purchase freshly prepared food items from vending.

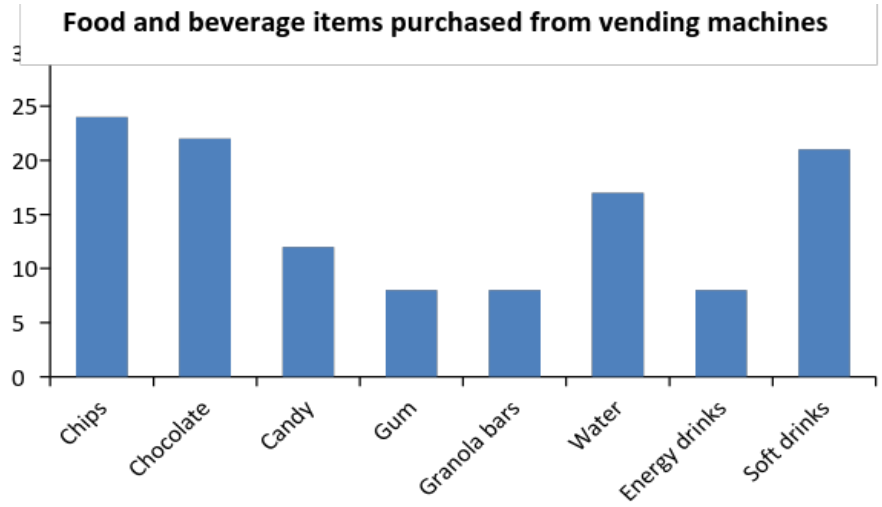


Figure 3 - Reported food and beverage items that the participants would purchase from a vending machine.

When participants were asked what kinds of food would they like to see in vending machines, many participants responded that they would want to see healthier and fresher options such as fruits, salads and sandwiches. However, some expressed concerns over the freshness and shelf life of fruits, and would have preferred dried fruits or other healthy choices with a longer shelf life such as nuts. Instant noodle and packaged microwavable foods were also commonly mentioned by participants since they are quick and easy-to-prepare. In addition, many participants stated that they would like to see more variety of beverages in vending machines, including coffee, tea, milk, bubble tea and fresh fruit juice. Hot drinks and hot water were mentioned by several participants, because sometimes there can be a long wait at cafes or they are simply closed at late night hours.

The majority of the participants would like to see more non-food convenience items available for vending. However, the preference for non-food vending items increased slightly from the commuter perspective to the residence student perspective (Figure 4). When participants were asked to answer what non-food essentials they would like to see available for vending, writing implements, cold/flu medicines, feminine hygiene products, toothbrushes or toothpaste and shampoo were the most popular (Figure 5). Condoms, stockings and hair products are also commonly chosen. Toilet paper, underwear and other convenience items including batteries, chargers, floss, wet wipes and detergents were also mentioned by some of the participants.

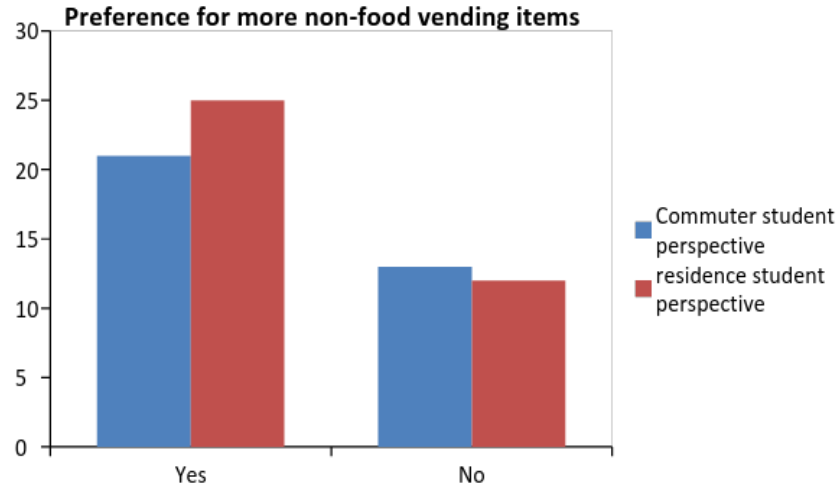


Figure 4 - Participants preference for more non-food items available for vending from both commuter and residence student perspectives.

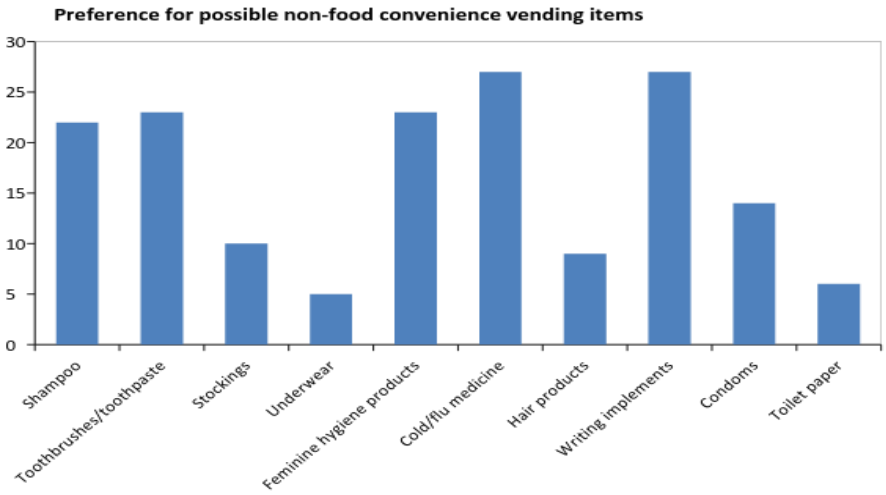
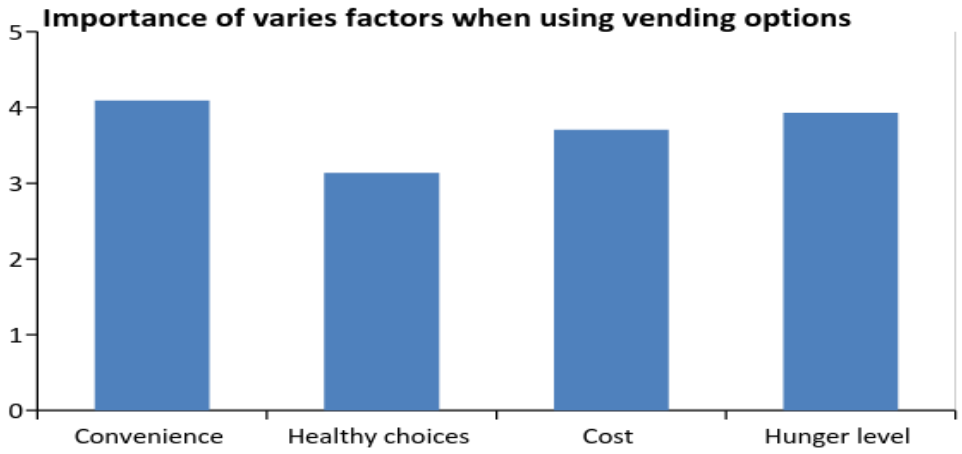


Figure 5 - Non-food convenience items that the participants would like to see available for vending.

When using vending options, convenience was reported to be the most important factor, followed by hunger level and cost, with healthy choice being the least important to the participants (Figure 6). The importance ratings were similar among difference factors except between convenience or hunger level and healthy choices ($P > 0.05$). Importance of both the convenience and hunger level factors were significantly higher than the averaged importance of healthy choices.



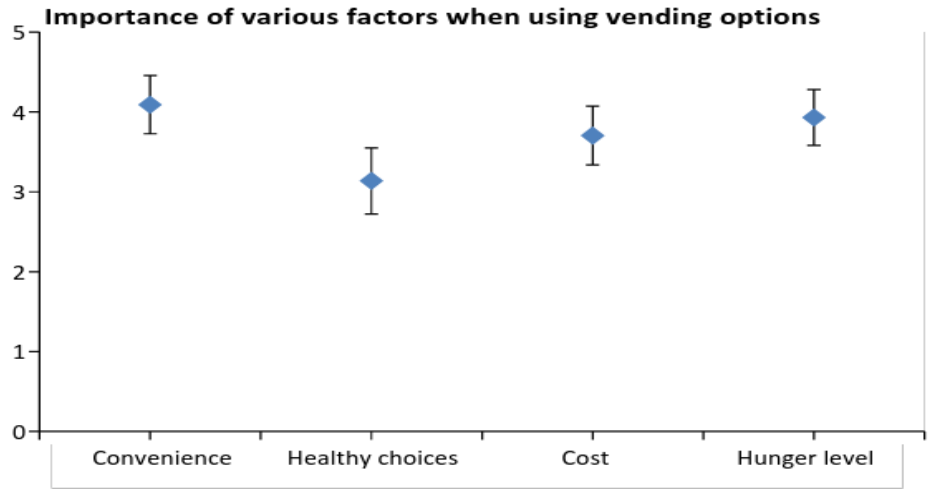


Figure 6 - Averaged importance rating of convenience, healthy choices, cost and hunger level.

Change and credit card were reported by the participants to be the most preferred methods of payment when using vending machines (Figure 7). Debit card and student card were also commonly used payment methods. Paying with bills is the least preferred when participants use vending.

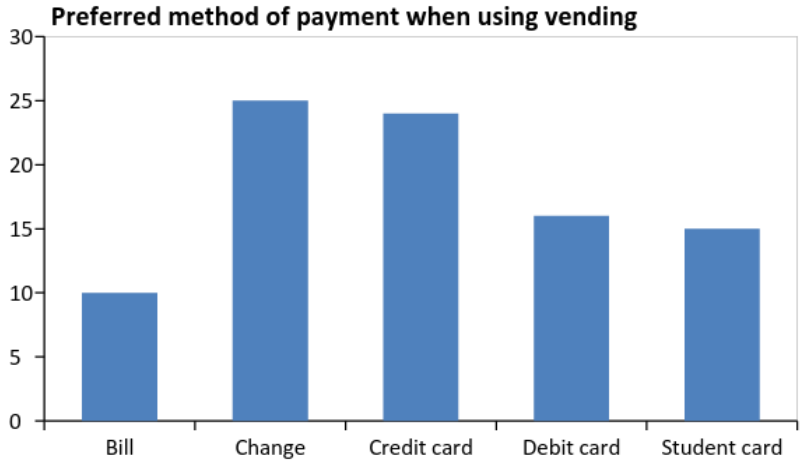


Figure 7 - Participants preferred payment method when using vending machines.

Discussion

This study has shown that although most of the students are infrequent vending machine users, many of them (~64%) use vending more often when they are studying on campus which contributes to the vast potential market of vending on UBC campus. Unhealthy food and

beverage vending options such as chips, chocolate and soft drinks are still the most prevalently purchased vending items, even though there is high interest from participants for healthier items and an ever increasing supply of healthier snack and drink options on the market. Over half of the participants would purchase freshly prepared food from vending if it is available, but still a considerable proportion (43%) would not purchase freshly prepared food items from vending machines even assuming there were appropriate data and ingredient labeling. Similarly, many participants wanted to see more healthier and fresh options in vending machines. However, concerns over the freshness and shelf life of fruits and other healthy choices might hinder consumers from buying these items from vending machines. Ironically, convenience and hunger level were the most important factors when using vending options, whereas healthy choices was reported to be the least significant. Therefore, quick and easy-to-prepare food items such as instant noodle and packaged microwavable food were still commonly suggested by the participants as potential vending options.

In the comments portion of the survey responses, three categorical themes arose from students who expressed their desires for food items they would like to see in vending machines. The first theme was "freshness," as many students were dissatisfied that items currently available tend to be heavily processed. Items that were mentioned that fit into this category include fresh fruits, salads, sandwiches and yogurts. This category of foods was perceived by our respondents and as being healthier, and preferred for their taste and texture attributes which contribute to their "freshness". Furthermore such products tend to be lower in salt and fats which is a dietary consideration for many students when purchasing food items in general. However it has been noted that there are students who expressed a distrust of purchasing fresh items from a vending machine due to their short shelf life. These students reported they would not buy such products

in this manner because of the potential for expired items to be bought by accident with no clerk available to immediately refund a purchase. An attempt to resolve this issue in is indicated in the recommendations section. The second category which came up was the issue of nutritional density. Many respondents make choices from vending items for their energy density but were dissatisfied with the lack of corresponding nutritional density. For instance: chips and chocolate are both energy dense but lack nutritional quality. Some students reported that they prefer to choose items such as granola bars or trail mix due to the presence of both energy and nutritional quality but wished to see more variety as currently there only remains one option of each in campus vending machines. This is an important category for students as vending items are frequently bought as "study fuel," but many students would prefer not to sacrifice nutrition to achieve energy in their study sessions. The final category identified was the issue of having more specialty or sustainable food options. Examples of such options reported included organic and gluten free. Many students are happy to see the availability of such options in other campus food sources such as cafeterias and cafés and would like to see this diversity extend to vending machines which are more convenient as they are available at all hours.

The majority of the participants would like to see more non-food convenience items available for vending, writing implements and daily commodities such as cold medicines, feminine hygiene products, toothbrushes or toothpaste and shampoo, were popular among the participants as potential non-food vending items. The demand for more non-food items is higher for residence students than commuter students since residence students spend more time on campus and need more convenient sources of groceries.

Non-food vending using an alternative system designed by Vancouver company called Sproot was also considered, which is developing a prototype machine that will dispense liquid

soap, shampoo and laundry detergent into refillable containers (Chou, Personal Communications, 2015). This system is being designed as a sustainable alternative to the bottled soaps and detergents found in stores (Chou, Personal Communications, 2015). Sproot's model is to provide natural and biodegradable products at a price that students would be able to afford at a price point of $5 per 500ml (Chou, Personal Communication, 2015). This type of vending system would be a valuable addition to student residence resources as it can save a long walk to the closest store while keeping in mind both the students and University's mission of sustainability. The current prototype model is expected to limit variety so as to reduce costs at this early stage (Chou, Personal Communications, 2015). However the idea was discussed of including a mechanism to mix scents chosen by students on the fly which would reduce space and the capital costs with purchasing multiple varieties and attempting to have them all sell (Chou, Personal Communications, 2015). This process would likely use essential oils mixed in with the product as it is dispensed (Chou, Personal Communications, 2015). This is an exciting idea because students could then create customizable scents to suit their preferences. It has been recommended to Sproot's co-founders that they should continue to pursue set up of a prototype in a campus residence. It has also been suggested that they partner with a UBC student or SEEDS with the potential for receiving a grant to reduce capital costs and additionally so that the company and the University can co-benefit from the research. Engineering, Chemistry and Sauder may be interested faculty partners for such a venture.

In addition to the survey data, quantitative data was analyzed form the March 2015 sales reports of the three residence mini-marts located in: Gage, Totem Park and, Place Vanier. It was hoped that this data would provide an insight into student preferences for items purchased from residence mini-marts so that we may have a better perception of the items that could sell well in

the proposed vending system for the Orchard Commons. This data showed grocery and frozen food items, and cold beverages create the most revenue based on their percentage contribution to sales (Barker, Personal Communication 2015). Hot food also generated large revenues (Barker, Personal Communications, 2015) but due its exclusivity to the Totem Park mini-mart (Magda's) and the lack of potential to include such items in the proposed vending system for the Orchard Commons it has been omitted data from this discussion. The lowest grossing items were: gum/mints, fruit and bakery items (Barker, Personal Communications, 2015). Units sold give the perception of the preferences of students when purchasing mini-mart items. Grocery foods were the biggest seller with over 17,000 units sold in March (Barker, Personal Communications, 2015). Cold beverages came in second with over 16,000 units (Barker, Personal Communications, 2015). Chocolates were third at over 5,300 units sold (Barker, Personal Communications, 2015). It was suggested in the recommendations that the community partner use both, units sold and revenue information as a means of informing choices of products to be vended in the potential Orchard Commons vending system. Current research is lacking in the specificities of what the arrangement would be here at UBC and how the cost of such a system compares with the capital costs of establishing a residence mini-mart. For this use omitting the data from Gage's mini-mart is best because that residence contains full kitchens in apartment style accommodation which likely leads to different shopping habits and therefore food choices from mini-marts than can be found among dormitory residents. For instance, Gage residents are more likely to go grocery shopping than Totem or Vanier residents and thus are also more likely to already have things like fruits or frozen foods in their home. This is less likely in a first-year residence and is expected to be the same in the Orchard Commons where the dorms lack kitchens.

At this point in the discussion the context of the Orchard Commons and the future Vantage College mixed use building will be explained as it is the target location of a vending system to be considered in place of the traditional residence mini-mart. The Orchard Commons, which currently under construction between the Macmillan building and Totem Park residence at UBC is expected to open in 2016 as a mixed use space with: dormitories holding 1,049 beds, classrooms, cafeteria, lounges and recreational areas (UBCCCP 2015; UBCVC 2015). Due to the lack of kitchens in these dorms and the presence of a cafeteria (UBCVC 2015) it is anticipated that similar shopping and eating habits to those of residents in Place Vanier and Totem Park will be observed. Residents will be composed of international students with a high probability of low English proficiency, as a core aspect of the Vantage College program is an English language program (UBCVC 2015). It has been identified that these residents may have difficulty navigating an unfamiliar environment in trying to find food and non-food products they want or need, at least in the early part of their time spent at UBC. This factor will be an important consideration in assessing the value of a vending system over a mini-mart system in the final recommendation. It is likely that the market demand for convenience retail in the form of a mini-mart or vending system in this part of campus will be quite high due to the close proximity of high traffic areas such as faculty buildings for: Land and Food Systems, Computer Science and Cognitive Systems and, Forestry, as well as student residences: Thunderbird, Marine Drive and, Totem Park. With the addition of over a thousand student residences in the area by 2016, this area is likely to see an expanded need for sources of food with a possibility for non-foods as well.

The vending system which has been proposed as an alternative to a mini-mart for the Orchard Commons is the Shop24 automated retail system is pictured in appendix A. This device

has the capacity to store up to 200 items with weights ranging from 1oz. to 8lbs in a refrigerated system (Shop24 Global, 2013). It is assumed that there is a refrigerated section and non-refrigerated section as product images show two sections, with chilled items in one side and items that do not require refrigeration on the other. This product features a remote inventory management system to improve restocking and maintenance efficiency (Shop24 Global, 2013). In addition it possesses a user interface system for customer interaction to display product information such as nutritional content, ingredients, etc. (Shop24 Global, 2013). In the preliminary meeting with the community partner it was explained that a single unit would cost $250,000 upfront (Wakefield, Personal Communications, 2015). However, the Shop24 website explains that they provide their system free of charge (Shop24 Global, 2013), this could indicate that Shop24 may stocks the machine and retain all profits as well.

Group Reflection

As students in UBC, all of us have had first-hand experiences in dealing with the vending machines. In reading the past SEEDS report on vending machine it appears the current situation of vending machines have a lot of room for improvement. It was because of the thought of wanting to improve the quality of the vending machine that we decided to work on this project. During this project, we found out that there are many possibilities in how we can approach this, which made us happy since we have a lot of ideas. However, we know that we have to put a scope into our research question and since there was no report specifically about future of vending of UBC before we start with the simplest set of questions. But from that set of questions we have gathered so many ideas and information as to how we can improve the quality of UBC vending machines. What we found hardest to do is to connect sustainability with vending machine because before this project we never think of relating vending machine with

sustainability. Throughout the project we learned that there are many forms of sustainability and the main one that we found related to our project are social sustainability, food sustainability, and environmental sustainability. From the interview and our experience, we also learned that not everyone is aware of what sustainability is, how it connects to vending machine and how it benefits community as a whole. This is not surprising. We learned a lot through this experience whether it is how to work with our community partner, how to work with UBC community or how small change in something that people take it for granted (i.e. vending machines) can lead to more sustainable community. Therefore, we are hoping that the information, ideas and recommendations from this project will be used as a contribution into improving vending machine throughout UBC and provide readers with more understanding about sustainability.

Recommendations

The first recommendation is too meet the required objective of determining whether the Shop24 system is a viable alternative to a mini-mart in the future Orchard Commons residence. This recommendation is to support the implementation of such a vending system over a mini-mart. The primary reason for this recommendation is that it will enhance social sustainability in this rapidly growing section of campus. While there are some drawbacks to having this system for low proficiency English speakers, because it lacks the tactile experience of being in a store with a human being that may be more informative about products than the impersonal vending machine, it is believed that its benefits outweigh this drawback. The greatest benefit seen is the improved convenience of having access to a similar inventory as a mini-mart at all hours which is in high demand for students. Additionally, this provides a safe alternative to walking to the University Village across campus to eat at the 24-hour McDonalds or late night pizza. It will also improve access and variety of food in a high traffic area of campus. Based on the growing

popularity of such a system in campuses across the U.S (Williams, 2013), this system will likely prove to be a success. The $250,000 cost of the machine is a barrier to its choice over a mini-mart as reported by the stakeholder. In that case it is suggested that an alternative of providing a few classic vending machines in its place, with at least one of them offering refrigerated food items, and one offering non-food items. This will maintain the 24 hour access that benefits students and savings on labor costs, however at the detraction of some features such as the retrieval system of Shop24 which carefully delivers items allowing for the vending of more fragile foods. With the proximity of Totem's mini-mart it is possible that having a vending alternative in the Orchard Commons makes even more sense. Also, if this system is instituted, it is suggested that SHHS use mini-mart data from Totem and Vanier as mentioned in the discussion to inform inventory choices.

The second recommendation is regarding the food items that students would like to see in campus-wide vending machines, meeting the second objective as developed with the community partner. Using the categorical themes identified from the comments section in the survey and student food suggestions a handful of potential foods have been provided that would work well and could be used as inspiration for other options. In our fresh category it is suggested to include fresh fruits such as bananas or oranges which are additionally good choices for their natural "wrappers", carrot sticks and small salads are other good options in this category. For the nutritious energy dense category an improved variety of granola bars and trail mix is suggested. Yogurt, hummus + crackers and, peanut butter + crackers could also be fun choices. Based on our specialty choices category, it is best to provide a small selection of items (organic and gluten free), then assess their turnover and increase the variety if sales are good. Furthermore, the inclusion of more foods that could be considered large snacks or even meal replacements should

be considered. Such items include sandwiches, sushi and instant noodles that come with their own bowl. Since the majority of these suggestions are refrigerated items it is therefore recommended to implement refrigerated food vending machines on campus. These machines use rotating shelves for item display and individual rotating doors for item retrieval. Furthermore such machines can group items for sale together such as an apple and sandwich with a drink for a complete meal. An example of such a machine can be observed in appendix C. Members of this team have used them before and have reported satisfaction with the results. Such machines can also house frozen items. In that case it would be beneficial to include easily microwavable ready-prepared foods such as samosas, burritos or dumplings which students can prepare as a meal the many microwaves dotted around campus.

The third recommendation concerns the non-food items students wish to see available in the campus vending machine. All of these products should be included in the Shop24 system, if it is used, and for other campus machines, having a couple items included in each machine, not to have its own machine would be adequate. This way a variety of items could be sprinkled around campus without concentration in one area. The suggested items: cold/flu medicine, writing implements and feminine hygiene products could realistically be seen as needed anywhere on campus by all student groups (commuter and resident alike). While the other three product suggestions: condoms, toothbrushes/paste and soap/shampoo are more residence specific. Regarding soap and shampoo, the Sproot vending model of dispensing soap, shampoo and laundry detergent into refillable containers is suggested. SHHS should coordinate with this company to explore how this prototype could be implemented. This model has a high potential for success on campus while reducing waste from plastic containers and, improving student satisfaction through convenience and customization.

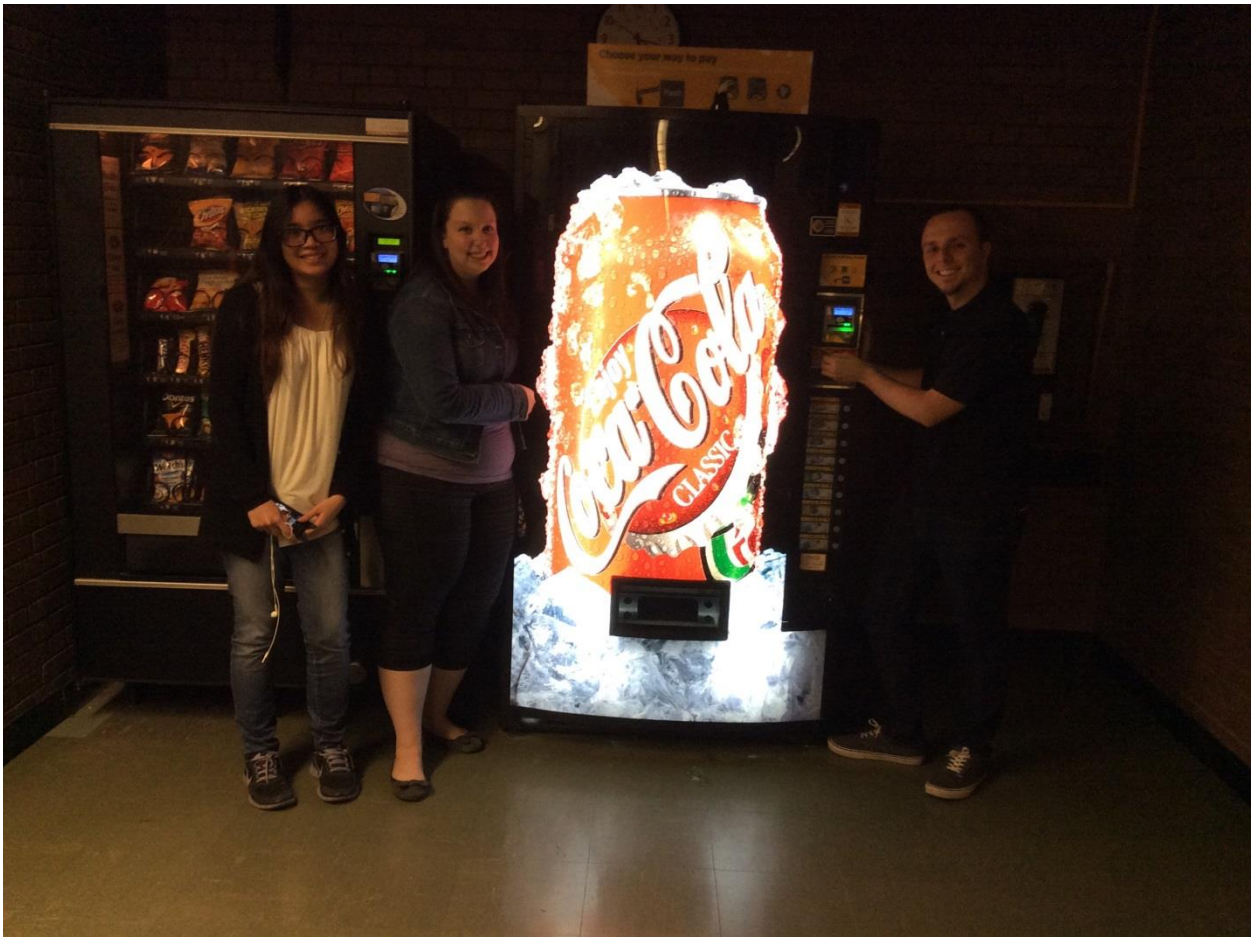
The fourth and final recommendation aims to partially meet the third objective which is to identify areas where UBC's vending machine system can be more sustainable. To improve environmental sustainability it has been identified how energy can feasibly be reduced in campus vending. A study by Zaremba & Harnanan (2015) of UBC vending machine energy consumption reported that of the 111 chilled beverage vending machines, only 20% have been Energy Star rated. Machines with ratings they reported consume over 50% less energy than the non-rated counterparts which use approximately 3,400Kwh/year (Zaremba & Harnanan 2015). Therefore phasing out of older models to be replaced by Energy Star rated machines to consume less electricity and campus energy demands is highly recommended. In the event that older machines cannot be replaced another option also investigated by Zaremba & Harnanan (2015) is to a device called "vending misers" which is installed on top of a machine and improved energy efficiency by monitoring customer traffic so that the machine does not run at full capacity constantly. This device is $230 and costs $20 to be installed, it has the potential to reduce energy consumption of older vending machine models from 3,400Kwh/year to 2000Kwh/year, this means a payback period of only 3.2 years (Zaremba & Harnanan 2015). It was determined by that these devices do not negatively affect beverage temperature or customer satisfaction (Zaremba & Harnanan 2015).

Scenario Evaluation and Feedback

This project was successful on the basis that trends in what students at UBC are using and looking for in vending options were observed. Based on the calculation of ideal sample size a goal was in place to reach 50 survey participants (Sample Size Calculator, 2015). Response rate was only 44 participants; however response rate was nearly 100%. The sample size is small and thus our results cannot be considered statistically significant beyond a confidence interval of 14,

but the results will provide direction for future groups to research different options for vending in Vantage Commons and across campus. As with many surveys, it would have been useful to survey additional students, but time constraints due to time required for survey design including the pre-test and duration of the course were limiting factors. It may be useful to have another group conduct an identical survey to this group's (see appendix A) in a future class so they could survey closer to an ideal sample size of approximately 500 participants with a confidence interval of 4 (Sample Size Calculator, 2015). Use of an identical survey would take allow for more time to research and advertise before analyzing data. Future success of the project could be determined by how much the vending machines are making in comparing new products to old products, profitability trends and turnover in on campus machines and comparing the Shop24, or other vending system to be implemented, to the mini-marts. Another measure of success could include an environmental impact analysis to determine if new vending system are more energy efficient than the currently outdated and energy draining systems. Success would be determined by positive values towards the new vending options. It is suggested that future project descriptions include the connection to Vantage College so students understand the implications of their research.

Media Release



Everyone has used a vending machine at some point in their lives. This year as part of an LFS 450 SEEDS project, this group (plus our photographer) looked into the kinds of vending options students at UBC in residence and as commuters purchase and what kinds of products they would like to see in vending machines across campus. Beyond typical vending machines outside of lecture halls, SHHS was interested in replacing a mini-mart set up in Orchard Commons with a vending system. The team surveys students for opinions and found out UBC students want more options: healthy, fresh foods and beverages as well as more essential non-food items: shampoo, cold or flu medicine and writing implements. This research shows an interest in other vending options to join universities around the world in offering a grocery store in a vending machine.

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Appendix A

Shop24 Example: Retrieved from

https://c2.staticflickr.com/4/3111/3110909178_c92cd8bcef_b.jpg

Appendix B

Future of Vending Survey

*Required question

1) Have you ever lived on campus? *
   - Yes
   - No
2) Have you ever been a commuter student (i.e. non-residence)? *
   - Yes
   - No
3) Are you an international student? *
   - Yes
   - No
4) How often do you use vending machines? *
   - Never
   - Less than once a month
   - 1-5 times a month
   - 5-10 times a month
   - More than 10 times a month
5) Do you use vending machines MORE when you're studying on campus *
i.e. during exam time
   - Yes
   - No
6) What kind of food and beverages would you purchase from a vending machine? *
Note: these are currently available in vending machines; you can select more all that apply
   - Chips
   - Chocolate
   - Candy
   - Gum
   - Granola bars
   - Water
   - Energy drinks
   - Soft drinks
   - Other:
7) Would you purchase freshly prepared food items from a vending machine *
Note: assume there are appropriate date and ingredient labeling (i.e. Tuna sandwich)
   - Yes
   - No
8) What kinds of food and beverages would you like to see in vending machine?
**Note: can be ANYTHING; i.e. Salad, Fresh fruit, Bubble tea, pastries etc.*
9) Could you explain your rationale for the items you listed in the previous question? (optional)
10) Would you like to see more non-food items available for vending (i.e. convenience items like toothbrushes, toothpaste) *

Please answer this from a commuter perspective

- Yes
- No
- I haven't been a commuter student

11) Would you like to see more non-food items available for vending (i.e. convenience items like toothbrushes, toothpaste) *

Please answer this from a residence student perspective

- Yes
- No
- I haven't lived in residence

12) What kinds of non-food essentials would you like to see available for vending? *

Please be creative, and you can select all that apply

- Shampoo
- Toothbrushes/Toothpaste
- Stockings
- Underwear
- Feminine Hygiene Products
- Cold/Flu Medicine
- Hair products
- Writing implements
- Condoms
- Other:

13) Please rate the importance of convenience when using vending options *

On a scale of 1-5; where 5 is the very important and 1 is not important

- 1
- 2
- 3
- 4
- 5

14) Please rate the importance of healthy choices when using vending options *

On a scale of 1-5; where 5 is very important and 1 is not important

- 1
- 2
- 3
- 4
- 5

15) Please rate the importance of cost when using vending options *

On a scale of 1-5; where 5 is very important and 1 is not important

- 1
- 2
- 3
- 4
- 5

16) Please rate the importance of hunger level when using vending options *

On a scale of 1-5; where 5 in very important and 1 is not important

- 1
- 2
- 3
- 4
- 5

17) What is your preferred method of payment when using vending? *
You can select more than one

- Bills
- Change
- Credit card
- Debit card
- Student card
- Other:

Appendix C

Example of a refrigerated food vending machine. (Retrieved from http://www.qualityvending.ca/images/Shopper724.jpg)