UBC Social Ecological Economic Development Studies (SEEDS) Student Report

An Investigation into Sustainable Pub: Water Option

Yi Xu, Xu Chen, Guangyu Zhang, Qianzhen Gao

University of British Columbia

APSC 261

November 27, 2014

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APSC 261: Technology and Society

Course Coordinator: Dr. Carla Paterson

Tutorial Instructor: Dr. Saloome Motavas

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Yi Xu

Xu Chen

Guangyu Zhang

Qianzhen Gao

ABSTRACT:

The Koerner's pub, located on campus (6371 Crescent Rd., main entrance off West Mall), is interested in becoming even more sustainable, particularly in the areas of water and energy use. By implementing sustainable assessments on Koerner's pub, the University of British Columbia could determine opportunities for further sustainable practices on other campus buildings. Thus, the pub is cooperating a team of the APSC 261 course to investigate its devices, working environment, and sustainability policies to develop and propose a strategy to enhance water sustainability. This project is finding and making recommendations on steps Koerner's pub could take to enhance its sustainability in the area of water usage. Considering the pub has implemented a number of sustainability initiatives, including to-go containers, compostable napkins and straws, naturally raised and hormone-free meat, and Ocean-Wise certified seafood and fish, to improve its devices or purchase new equipment will be unnecessary, uneconomic and unsustainable. The most suitable option to enhance sustainability in the area of water usage is to strengthen awareness and cooperation of employers and employees with effectively water usage and water conservation. Thus, this project will provides useful recommendations with analysis on better sustainable water usage behavior between employers and employees instead of improving the devices or purchasing new equipment.

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GLOSSARY

1. A typical pre-rinsing valve: a valve is used to remove food wasted from the dishes before putting into the dishwasher.

2. Rinsing power : the electric power used by valve

3. Three-component sink: a sink is water efficient when doing the hand washing process

LIST OF ABBREVIATIONS

UBC: University of British Columbia

TBL: Triple Bottom Lines

GPM: Gross Profit Margin

1.0 INTRODUCTION

Water supply is finite. We merely have the water resource that we have now, and there is only four percent of the whole water resource is available for human using. To find a way to save water resource, we may find a way to effectively using water on our around food services (the Koerner's pub), then we may find a way of water conservation on other (UBC) further sustainable practices.

Our team have contacted with the stakeholder, Brittany Yu, to investigate the working environment, water usage history, and current devices, so that we can set up strategies to consider which aspects we can reduce the amount of water usage and can get the information of each device to ensure the devices is in the sustainable standard.

The purpose of this report is to perform a sustainability assessment of Koerner's pub to identify opportunities for further sustainable practices. The pub, located on campus (6371 Crescent Rd., main entrance off West Mall), has signaled a commitment to sustainability, and has implemented a number of sustainability initiatives, including to-go containers, compostable napkins and straws, naturally raised and hormone-free meat, and Ocean-Wise certified seafood and fish. The devices and equipment that the pub is using are reach the international sustainable standard. Water conservation means using water wisely and caring for it properly. Thus, in this report, we will provides useful recommendations with analysis on better sustainable water usage behavior between employers and employees instead of improving the devices or purchasing new equipment. Water conservation is a job for all human who want to have access to the life sustaining resource of water.

2.0 EDUCATE STAFFS

A pub's employees and its staffs are an integral part of water conservation. While the water has to use frequently and the pub has to be sustainable, it is important to hire pub employees that know how to use water effectively, orderly, and properly. Thus, employers need to learn how to train pub employees to ensure pub service and sustainability success.

2.0.1 SET A GOOD EXAMPLE

It will be a great method that training pub employees by setting a good example for them with the employers' behavior. As a holder, he is always being observed by his employees, and new hires will especially look to him for the right way to conduct themselves. If the stakeholder can effectively, orderly, and properly use water, then so as the employees. When working with other members of the staffs, vendors and diners, the stakeholder need to professionally keep and require himself as the first good example with water conservation.

2.0.2 ENLIST THE BEST STAFF

One of the most effective ways to train pub staffs is to have them shadow an outstanding employee with a good performance record of water conservation. Choose one of the best staffs in the same position in which new hires will be working. Have the new hires shadow them for couple days to observe how they handle dishwashers, ice-makers, coffee-makers and other related using water devices responsibilities. If time

permits, have the new hires shadow the best staff in other important positions to give them a better understanding of how the whole pub team works in a sustainable environment.

No one will be better able to understand why water conservation is important for a new pub employee to know than the veteran staff members. Take advantage of their experience and let them help train new hires in the most important aspects of water conservation. This could include water safety, washing dishes and helping customer have a better using water habit that they have learned through water conservation experiences.

2.0.3 TEACH NEW EMPLOYEES

It is important to give new pub employees training in all the position related to using water in the pub. We do not want them to waste too much water, behind the bar if legally permissible, on the dishwasher, coffee-maker, ice-maker, washroom or food services. This will help them become more flexible in their duties and give them a better understanding of what it takes to save water in the pub successfully.

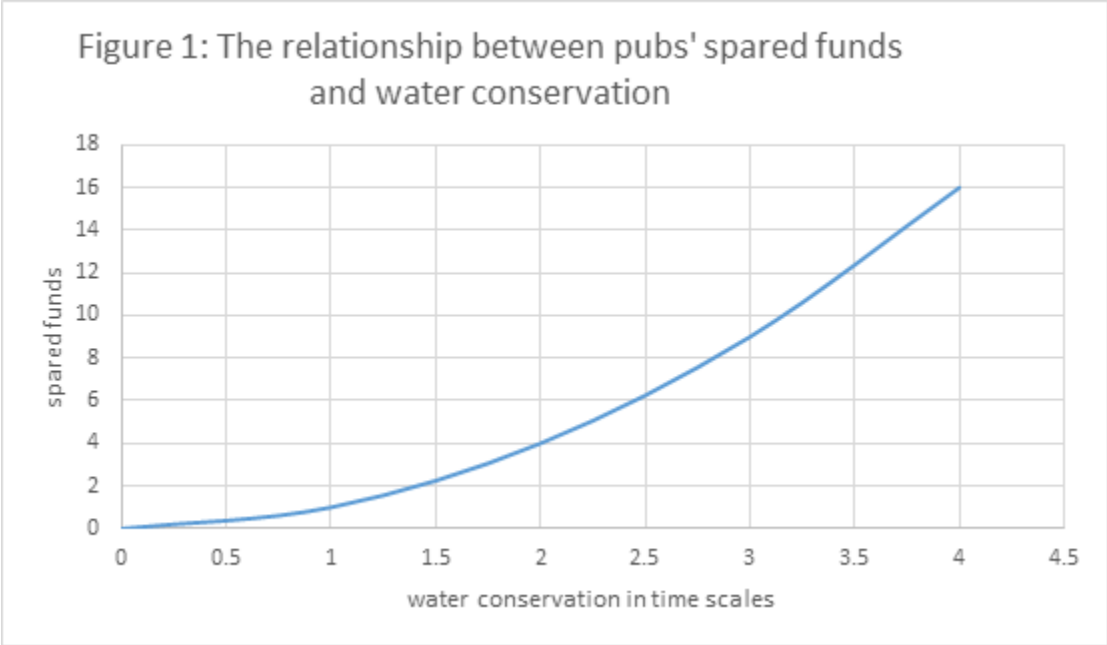
2.0.4 PRIORITIZE WATER CONSERVATION

While there will be a lot of important information to cover with the new hires, effectively using water will be the second priority after food and occupational safety. Emphasize these areas of water conservation as they pertain to the new hires' position and the pub as a whole. Review water using procedures and rules throughout the

training process to ensure they are understand how to reduce the amount of water usage and proper using water.

2.1 ECONOMIC IMPACTS

The main factor that is used to determine the economic impact of water conservation in the pub is it saving funds by saving water. The relationship between the water conservation and spared funds as shown in Figure 1 below:



As shown in the figure above, the spared funds is increasing with water conservation in longer time scales. It is important to consider that how to effectively and sustainably using water in the pub, because the more water the pub save, the more profits can be made with the more spared funds.

3.0 IMPROVING DISH WASHING PROCESS

Dish washing process is one of the largest usages of water process in many restaurants. Since the most equipment at Koerner's Pub are sustainable and water efficient, it's important to save water starting from using low flow spray valve and take care of small washing process such as presoak and operating the dishwasher.

3.1 PRE-RINSING VALVE

Pre-rinsing is the first step for dishwashing. However, this process consumes a huge amount of water due to the unsustainable design of the pre-rinsing valve. Usually, this process will cost about 1/3 of the entire dishwashing process. So it is critical to save water starting from the pre-rising process.

Hours of Spray Valve Usage	Water Savings gallons/day	Waste Water Savings gallons/day	Gas Savings therms/day
1 hour/day	60 gallons	60 gallons	0.5 therms
2 hours/day	120 gallons	120 gallons	1.0 therms
3 hours/day	180 gallons	180 gallons	1.5 therms

Table 1: Low Flow Valve water saving table

[1] Table form: https://conserve.restaurant.org/Learn/Save-Water/Pre-rinse-spray-valves

3.1.1 Typical Pre-rising valve Versus Low Flow Models

A typical pre-rinsing valve is used to remove food wasted from the dishes before putting into the dishwasher. The standard for US standard commercial used pre-rinsing

valve is about 1.6 gallons per minute (6 liters per minutes). Most of them cost about 30-40 dollars and are easy to change.

However, a low flow valve usually cost about 15-20 dollars more expensive than the regular one and last about 5 years. It only uses about 1.2 gallons per minute (4.5 liters per minutes), and the best valve can reach as low as 0.64 gallons per minutes (2.27 liters per minutes). To change a low flow valve doesn't cost much but it can save a lot of money by saving water from the pre-rising process. As we can see from the table above, the low flow pre-rinsing valve can save about 700 dollars per year depend on how much water the pub used each day, which can replace about 12 new low flow pre-rinsing valve.

3.1.2 Rinsing Power of the Low Flow Valve

Some people may worry about if the low flow valve will give a bad rinsing result or can left some food waste on the dishes. In fact, the low flow model usually has a smaller nozzle that can greatly increase the water velocity. In addition, most low flow valves are designed with a more efficient water patterns. All of the designs combined together results a more efficient way of removing the food waste. Since it can remove the food so efficiently, the commercial dishwasher don not needs to wash hard. As a result, improve the pre-rinsing valve can increase the life of Koerner's pub's dishwasher.

3.1.3 Low Flow Valves Example

One of the Low flow valves we found online is 3/4-14 UNS, 1.0GPM made by Chicago Faucets. It only has 1.0 gallon per minutes flow rate and cost 58.62 CAD per

unit. It uses stainless steel for most of the part and has a heavy-duty rubber bumper. It also inter grated with handle locking clip. This valve will satisfy the use at Koerner's pub and will do a great work to save water if it can replace the current spray valve.

Another option is the Chrome, 3/4-14 made by T & S. This valve only has 0.65 gallon per minutes but the main material is chrome. The price is about the same as the previous one, which is 53.74 CAD per unit. This one offers the basic use for the pre-rinsing process and has a very low water flow rate.

3.1.4 Saving not only the water

The low flow valve is easy to change and it can improve the pre-rising process to water sustainable way of washing the dishes. It helps reduce the water bills and because the most of the food waste has been removed, the dishwashing machine can run longer and saves more money.

3.2 BEHAVIOUR CHANGE AT DISHWAHSING PROCESS

The Koerner's pub already has many water and power efficient dish washing equipment. Since there are not much we can change at the equipment side? However, we can improve the Koerner's pub's washing behavior so that we can save more waters.

3.2.1 Operate Dishwasher at full load

The commercial dishwasher is designed to be operated at full load. Washing the dishes at full load can provide the most water and power efficient way of operating the dishwasher. Running the dishwasher at half load waste not only water but electricity. It

is also important to run the dishwasher at the designed load, try not to over load it. Otherwise, too many dished may damage the dishwasher. In addition, over load dished can result uncleanness of the dishes, which require further washing process to clean the dirty dishes.

3.2.2 Checking the leaks

Some small leaks are difficult to find, the only thing we can do is to check the water usage regularly so that if the water usage recently is higher than usual, we may find the leak and repair it. While checking the dishwasher water usage, we can compare the usage data with the manufacture specifications to see if the usage is higher than expected. If a leak is found, try to repair it as soon as possible. Even a small speed of water leaking can result a huge unnecessary water waste if it runs for days.

3.2.3 Using the Three-Component Sink

One thing we found at Koerner's pub is that the three-component sink was not been used often. Actually, three-component sink is water efficient when doing the hand washing process. It can save a lot of water by soaking the dishes with sink instead of using running water to clean it. Also, using the three-component sink can also help the meet the health requirement of the dishes.

3.2.4 Presoaking all the dishes

Before the rising process, dishes, pans, pots can be presoaked in basin of water. Presoaking process help remove and soften the food waste on the dishes and make it

easy to pre-rise the dishes. In another word, presoaking can help to reduce the water used in the following process and help longer the usage life of the dishwasher. What's more, presoaking can reduce the time of each washing cycle because the food is easier to be removed from the dishes after the presoaking process.

3.3 TBL ANALYSIS OF WASHING PROCESS

Improving the washing process not only save just the water but also the money. As we mentioned the before a good using habit can often longer the usage life of Koerner's Pub's equipment. In addition, for the social part, making Koerner's Pub a water sustainable pub by changing the washing process gives customer a good impression as well as educates those students and staffs who go to the Pub. In a word, improving the washing process not only benefits the environment, but also reduced the water bill and educates the society.

4.0 General Building Maintenance

The average restaurant uses about 5,800 gallons of water per day. According to EPA's Water Sense program, 52 percent of that is used in kitchens, and another 31 percent goes down the drain in restrooms. Besides these places that we have mentioned in the previous sections, another aspect in a restaurant that needs a large amount of water is general building maintenance. It includes indoor cleaning, landscaping, equipment maintenance and replacement, etc. In daily maintenance, leak detection is also an important process to avoid wasting water.

4.1 Dry Floor-Cleaning Method

The traditional bucket-and-mop floor cleaning method not only needs large amount of water, but also creates a slipping and tripping risk both for the cleaners and people passing through that area. The floor can remain wet and slippery for a long time after cleaning.

The dry cleaning process reduces the use of water by removing dry loose dirt with a dry mop. For individual stains on surfaces, cleaner could dampen them with water and then wipe off. Only for those dirtier surfaces that could not be gotten rid of by former method, a moistened mop is required.

4.2 Landscaping

Koerner's pub provides outdoor seats surrounded by lawn and trees. Reducing the amount of water use for plant Irrigation and maintenance is another possible solution.

- Irrigate the plants and lawns only when needed and early in the morning when the evaporation is the lowest.
- Consider using low-volume irrigation, such as a drip system.
- Avoid runoff. Make sure all water is directed by irrigation system to landscape areas.
- Check irrigation system for leaks and broken heads at least every two weeks.

4.3 Leak Detection

Check regularly for leaks and repair them as soon as possible. Read water

meters and compare the results to the same month of the previous year. This will help to identify leaks as they occur as well as monitor your conservation efforts.

Using leak detection tablets to rapidly identify a leaky toilet tank which might waste thousands of gallons of water per year. If you've discovered a leak, replace the flapper (the plastic plug in toilet tank). Flapper is usually the reason of leaks and is inexpensive and easy to replace.

5.0 GARBAGE DISPOSAL

Management and control of garbage disposal in the water sewage system is vital because of its potential harm to the system and to the society as a whole if the system fail to work properly to deliver wastes from the drain to the City's treatment plants. Back-ups of sewer system can occur when the sewer lines are clogged with a buildup of fats, oil, and greases along with food debris.

5.1 SUGGESTIONS OF CHANGES IN EQUIPMENT

One of the common devices we used to eliminate the garbage can and make possible a sanitary means of disposal at a reasonable cost is the garbage grinder. However, from evidences and studies from the American Journal of Public Health and the Nation's Health, we can conclude that "the [garbage grinder] will involve a definite increase in domestic water consumption and an addition of ground garbage to sewage" because it can operate only with a strong flow of cold water [4]. We recommend a cheaper and simpler substitution for the garbage grinder -- the garbage disposer strainer. The garbage disposer strainer alternatives are the ideal solution at least for

now for defective commercial garbage disposing, because they are not only better for the sewer system, but also better for the environment. Comparing the features of the traditional grinders and the strainer, it is evident that the strainer is a better choice. The strainer is much safer to the users. Unlike the spinning motor and blades designs in the grinders that might cause serious injuries if used inappropriately, the strainer itself is completely mechanical without moving parts and does not operate using electricity. This also gives strainers the advantages that they are cheaper to buy, to maintain, and also to use (no electricity or cold water needed).

5.2 PERSONNEL TRAINING

We suggest our stakeholders from the Koerner's Pub to develop a detailed training program aiming for the workers to raise awareness of sustainable water usage in public food service settings. We also recommend implementations of requirements and rules that the employees obey to enforce water conservation actions. One of the most common guideline is that the workers need to scrape dishes using a scraper, squeegee or absorbent over the garbage can before rinsing and loading into the dishwasher. This will keep food debris and grease from going down the drain to the sewing system that may lead to damages or leakages in the pipeline.

5.3 ANALYSIS

The above changes in the area of garbage disposal will have positive effects on the sustainable water usage plan in the Koerner's Pub. Changes from garbage grinders to drain strainers can reduce the cost of the garbage disposing system for the low initial

fixed cost and maintenance cost of the drain strainers. Not only that, since the strainers do not need running cold water or electricity to operate, the Pub will be able to see a reduction in its electricity bills. When it comes to the social effects, with the implementations of the employee training programs on topics related to sustainability in the pub, the society benefit. The program will educate more people about sustainable practices that they might carry away to use in their everyday life to achieve water conservation as a bigger group. Last but not least, the suggestions above on garbage disposal are good to the environment because it reduces the use of limited resources such as water and electricity.

6.0 LOW-FLOW FIXTURES

6.1 METHOLOGY

Before discussion on the topic of low-flow fixtures, we need to measure the water flow at the workspace or in the kitchen or the washrooms in the pub. Our group comes up with a simple and fast way to measure the water flow for a specific faucet in units of gallon per minute, which is the standard unit used with the low-flow fixtures aerators we are going to talk about in later part of this section. Open the tap to its full force. Take out a measuring cup, and hold it under the tap for 10 seconds. Read the measurement on the cup for water obtained after 10 seconds, and this is the water flow through the tap in 10 seconds. To get the values in its right unit (gallons per minute), we did a simple calculation to multiply the measured values by 6. This final value will be the amount of water flowing though that specific tap in the time period of 1 minute. A standard tap

without low-flow fixture aerator typically has a flow value of 2.2 gallons per minute as we measured.

6.2 FAUCET AERATOR

Low-flow aerators can be screwed on to the tip of the modern indoor water faucets. Main functions of a low-flow aerator other than control the flow rate include prevention of splashing by shaping the water stream coming out of the faucet spout while reducing the faucet noise at the same time [2]. With less than 5 dollars, we were able to get a decent low-flow aerator that can reduce the water flow of a 2.2 GPM water tap to 0.5 GPM.

6.3 BEHAVIOUR CHANGES

Our group thinks that it is necessary for the managers of the Pub to keep tract of their monthly water usage. We found out that this data can be obtained from the water meters installed by the City of Vancouver in the utility room in the Pub. Knowing the current and past amount of water used for the Pub would give the managers abilities to relate water usage to the business cycle and to be aware of something went wrong on the water conversation.

We also suggest the managers and also the employee of the Koerner's Pub to pay attention and look for association logos when purchasing or using utilities. One example of the facilities would be the International Association of Plumbing and Mechanical Officials that usually provides users information on the water usage of the products. Universal Product Code can also be found on a majority of the equipment and devices

in the Pub to help the managers to know more about where is water in the restaurant used at.

The Pub should also include rules regarding low-flow aerators in the personnel training and their kitchen rule. This is because of the tendency to remove aerators from kitchen faucets when the employees are filling up buckets, pasta pots, etc.

6.4 ANALYSIS

The above implementations do not have a huge effect on the economy because of its low cost (under 5 dollars each). When it comes to the environmental perspective, this would increase the degree of water conservation in the Pub. This also can help people to adapt to faucets with lower water flow rates to give them the habit of turning down the tap when the water flow is too big to prevent splashing with taps that don't have aerators in other locations.

7.0 Conclusion

Having analyzed all aspects of the water use in Koerner pub with concepts of the Triple Bottom Line, we have put forward many reasonable and practical proposals. We can confidently state that for all significant factors (economic, environmental and social), there will be a positive net effect if our suggestions were implemented.

In the economic aspect, our research mainly focuses on the behavior changes of staffs and low-cost investments like low flow valve. Most of the recommendations could be implemented in a short period of time with very low expense. It is clear that long-term benefits will significantly outweigh any initial investment that was made.

Water is a kind of important natural resources. So improving water efficiency not only saves money, but it also bring us significant environmental benefits.

As for the social aspect, it’s logical to conclude that the staff and customers will also be passionate about water sustainability, if the pub always emphasize such issues. For sure it has a positive influence on people’s attitude toward sustainability and then affects other people around them.

8.0 SUMMARY

The Koerner's pub, located on campus (6371 Crescent Rd., main entrance off West Mall), is interested in becoming even more sustainable, particularly in the areas of water and energy use. The pub is cooperating a team of the APSC 261 course to investigate its devices, working environment, and sustainability policies to develop and propose a strategy to enhance water sustainability.

Our team has investigated the working environment, water usage history, and current devices, so we set up strategies ensure the pub is in a sustainable status.

By educating the staffs, improving dish washing process, improving pre-rinsing valve, adapting suitable change at dishwashing process behavior, and also considering the water conservation aspects on general building maintenance, garbage disposal and low-flow fixtures, it will be easy to lead the pub to a sustainable culture.

With adequate personnel training and minor changes on the equipment usage, we can build a water sustainable culture in the pub and use water in more efficient way.

Thus, this report has provided some useful recommendations with analysis on better sustainable water usage behavior between employers and employees instead of changing the main devices or purchasing new equipment.

REFERENCES

[1] The National Restaurant Association’s Conserve Program: Serving up Sustainability. Retrieved from: https://conserve.restaurant.org

[2] Low-Flow Aerators. 26 Vol. BNP Media, 2008

[3] The kitchen garbage grinder. (1947). American Journal of Public Health and the Nation's Health, 37(5), 573-574. doi:10.2105/AJPH.37.5.573

[4] Southwest Florida Water Management District: Water Conservation in Restaurant. Retrieved from http://www.swfwmd.state.fl.us/conservation/restaurants/

APPENDIX A: DISH-WASHING MACHINE: KNIGHT KLE-235D

KLE-235D Specifications

KLE-235 D – P/N 9000023-01

Operating Capacity:	74 Racks Per Hour
Operating Cycle:	90 Seconds
Wash Time:	47 Seconds
Rinse Time:	28 Seconds
Drain:	15
Wash Tank Capacity:	3.8 Gallons
Wash Pump Capacity:	98 Gal./Min.
Recommended Wash Temperature:	120° minimum
Water Inlet:	3/4"
Drain I.P.S.	1-1/2"
Wash Pump Motor:	1HP
Dimensions:	25"x44"x67"
Table Height:	34"
Max. Clearance For Dishes:	16-3/4"
Standard Dish Rack:	(2) 20"x20"
Shipping Weight:	350 lbs.
Electrical Rating:	115V
Load Amps:	28

APPENDIX B: ICE-MAKER MACHINE