# ANALYZING THE FEASIBILITY OF IMPLEMENTING HAND DRYERS AT UBC'S WASHROOM

FOR UNIVERSITY OF BRITISH COLUMBIA (UBC) ALMA MATER SOCIETY (AMS)

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# INTRODUCTION

With 80% of infectious disease spread by hands, it is clear that washing our hands thoroughly is important. Drying of hands is equally if not more important as washing them to prevent the spread of contagious disease. Wet hands have been known to pick up contaminants more easily and can develop skin irritation. There are a few methods of hand drying that is suitable for modern day life. Among the most common methods are the use of paper towels and hand dryers.

## **PURPOSE OF STUDY**

The importance of washing hands is obvious; the benefits may be easily undone if not done properly. Paper towels have been overwhelmingly chosen as the preferred choice in most UBC's washroom, as is evident from the lack of hand dryers. As part of UBC's initiative to make the campus a little greener and more sustainable, there is a clear advantage of using hand dryers in terms of environmental sustainability. Hand dryers have shown to emit lower greenhouse gases and is more energy-efficient than paper towels. Aside from the environmental impacts, hand dryers make the process of cleaning the washroom easier. Many places that utilizes paper towels complaint about the mess paper towels can create.

One proposed solution is to switch from using paper towels to hand dryers at UBC washrooms. UBC would be able to operate more energy-efficiently and it makes the maintenance of the washroom easier. The simplest solution is to replace paper towels with those hand dryers.

#### METHODS

Data were collected in 2 stages. For the first stage, survey forms consisting of 5 multiple choice questions were distributed around UBC's Vancouver campus. The survey was designed to take no more than 5 minutes of the participant's time. Participants were told that the results would remain anonymous and that the feedback would go into analyzing the feasibility of implementing hand dryers at UBC's washroom. A total of 100 responses were collected. Participants came from diverse background and faculty.

The second stage of data collection was done by interviewing representatives from both UBC's electric power and energy systems group and Dyson AirBlades. Both interviews were designed to take no more than 15 minutes. Participants were told that the interview could be stopped should they feel uncomfortable at any time.

Professor Christine Chen from UBC's electric power and energy systems group was interviewed on her views regarding the environmental impacts of switching from paper towels to hand dryer and the effectiveness of drying of hands using paper towels compared to using hand dryers.

An interview with Mr. Alan Jenkin from Dyson AirBlades was conducted to review the cost for operating a hand dryer compared to paper towels. Mr. Jenkin has been a sale representative for Dyson AirBlade since 2005 and is very knowledgeable and up-to-date with his information and resources.

# **SCOPE OF STUDY**

Listed below are 5 areas of inquiry to assess the feasibility of switching from using paper towels to hand dryers:

- 1. How much does it cost to operate a hand dryer versus paper towel?
- 2. How effective in terms of cleanliness is hand drying by using a hand dryer compared to paper towel?
- 3. What are the environmental impacts of switching from paper towels to hand dryers?
- 4. How difficult would it be to switch from paper towels to hand dryers? What are the major hurdles?
- 5. How would students react to this change?

# **DATA ANALYSIS**

#### **SURVEY DATA**

A total of 100 surveys were conducted and completed within the week of February 29, 2016. Surveys were distributed and completed manually around the UBC Vancouver campus. At the end of the week, surveys were compiled and the data were analyzed. Each question on the survey is analyzed below.



Question 1 – Are you a UBC Vancouver campus student, if so please state your faculty.

A total of 100 surveys were collected as shown in Figure 1. All of the participants were from the UBC Vancouver campus and represented 8 different faculties. Data showed a fairly even spread of responses from different faculties. It is important to gather feedback from a diverse range of background to eliminate bias.





Based on Figure 2, a big majority of participants were either not at all or somewhat satisfied with the level of cleanliness of UBC's washroom. The results from this section strengthens our argument that washrooms that utilizes paper towels are harder to be kept clean. Paper towels tend to create a mess when not disposed off carefully.



Question 3 – How frequent do you wash your hands after using the washroom?

Figure 3 shows a big majority of participants (77%) always wash their hands after using the washroom. Intuitively, with paper towels as the only means of hand drying, there will be a large usage of paper towels. The data from this section parallels that of the last section. The data ties in perfectly with the argument that due to the huge usage of paper towels, the cleanliness of washroom becomes harder to maintain resulting in a lower level of satisfaction of washroom cleanliness as shown in the last section.

Question 4 – Would you be willing to switch from paper towels to hand dryers as the primary means of drying hands?



Based on Figure 4, almost all of the participants were willing to switch from paper towels to hand dryers as the primary means of drying hands. Participants that selected 'not willing' or 'somewhat willing' noted in the comments section that the heat emitted by hand dryers might potentially cause more harm than good to the environment.



Question 5 – How familiar are you with using hand dryers?

Figure 5 shows that everyone knew how to operate hand dryers. If change were to be implemented, most people would be able to operate hand dryers. Educational posters or videos on how to use hand dryer is not needed. Some of the participants suggested in the comments section that posters or videos regarding the benefits of using hand dryers could be used to raise awareness. Participants also indicated cloth towels as another alternative to paper towels.

# **INTERVIEW SUMMARY**

### Interview 1 - Professor Christine Chen – UBC's electric power and energy systems group

The interview with professor Christine Chen was approximately 20 minutes. This interview focused on 2 main topics: the environmental impacts of switching from paper towels to hand dryer and the effectiveness of drying of hands using paper towels compared to using hand dryers.

Professor Chen cited a recent study where they found the total number of bacteria on finger pads decreased by 76% after washing and drying with air dryer compared to an increase of 194% when drying with paper towels. The study concluded that air dryers should be used as opposed to paper towels (Davies, 2014). The same study also pointed out that hand dryers are more efficient as it needs less maintenance and creates less trash.

In regards to environmental impacts, many studies including one that was done by her found that hand dryers emit the lowest amount of carbon dioxide per use (table 1).

Method of drying per use	CO <sub>2</sub> emitted (grams)
Paper towels	56
Hand dryers	25

Table 1: Carbon dioxide (CO<sub>2</sub>) emitted per use of hand drying method

A recent study shows that not only does paper towel causes deforestation, the amount of CO<sub>2</sub> emitted is a major contributor to global warming (Redway & Fawdar, 2008). Taking all into account, users should use hand dryers when possible.

#### Interview 2 - Mr. Alan Jenkin – Dyson AirBlades

The interview with Mr. Jenkin was approximately 25 minutes. The interview touched mainly on the cost for operating hand dryer compared to paper towels.

Mr. Jenkin started by showing his company's latest hand dryer model. The new generation dryers are attached lower on the wall. Hands are dried downwards and in an enclosed area as shown in the Figure 6 below.



Figure 6. Dyson AirBlade Hand Dryer

(Figure adapted from http://media.dyson.com/downloads/CAEN/airblade/pdf/brochure.pdf)

Each Dyson new generation dryer cost \$1400 and can dry hands in 10-15 seconds. In terms of energy consumption, Dyson new generation dryer only requires 4.67 Watt-Hours of energy for every dry compared to 6.408 Watt-Hour for old conventional hand dryers. The biggest advantage of using hand dryers compared to paper towels is they require little to no replenishment or maintenance. Mr. Jenkin cited a recent article to compare the operational cost of hand dryer vs. paper towel (Clarren, 2007). The article found that operating paper towels is 5 times more costly than hand dryers (table 2).

Hand Drying method	Cost of acquiring a new unit	Cost per new Roll/unit	Cost of maintenance (\$)	1 <sup>st</sup> year initial expenditure for 2000 users/day
Paper towel	\$150/ automatic	\$2.75	\$0.024/use	\$17 <i>,</i> 670
	dispenser			
Hand dryer	\$1400 for Dyson Airblade	Depends on unit	\$0.0028/use	\$ 3 <i>,</i> 444

	Table 2: Cost compa	arison for installation a	and maintenance i	in first	vear with o	one unit
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Although the initial cost of acquiring a new unit of hand dryer is high, once the unit is

purchased, you are simply paying for the energy per use. On the other hand, the annual

expenditure of paper towel is so high because paper towels have to constantly be repurchased.

# CONCLUSION

#### SUMMARY

Based on data collected from the feedback survey, most participants thought that there was still room for improvement in regards to the cleanliness of the washroom. Cleanliness is a common problem for places that utilizes paper towels. Paper towels tend to create a mess when not disposed off carefully. In comparison, hand dryers create less trash and would dramatically increase the level of cleanliness of washrooms. With that in mind, most participants indicated a willingness to switch from paper towels to hand dryers.

In terms of environmental sustainability, hand dryer was found to emit lower levels of carbon dioxide compared to paper towels. This is because we need to take into consideration the disposal methods of used paper towels which involves transportation to and from the production, recycling and user sites. Consumption of paper towels is detrimental towards the environment because carbon dioxide is a major contributor of global warming.

Economically, by taking the cost and maintenance into account, hand dryers need \$3,444 compared to \$17,670 for paper towels per unit per year. It is clear that hand dryer is the cheaper alternative. Although the initial cost of purchasing hand dryer is high, the maintenance cost for paper towel is so high because it needs constant repurchasing.

As part of UBC's initiative to make the campus a little greener and more sustainable, there is a clear advantage of using hand dryers in terms of economical and environmental sustainability.

#### RECOMMENDATIONS

After conducting comprehensive search on the methods of hand drying, it is with confidence that I recommend the implementation of hand dryers at UBC's washroom to the committee of the Alma Mater Society (AMS).

Despite the many benefits of hand dryer, here are some additional recommendations that you might want to consider:

- (1) UV light hand dryers. It uses UV light to kill bacteria and viruses from the air that dries the hand. (Huang, 2012)
- (2) Hand dryers fitted with HEPA filtration. HEPA filtration system filters pollen and bacteria from the air that dries the hand. (Snelling, 2011)
- (3) Infrared sensor activated hand dryer. An automatic hand dryer that is more hygienic because users to not need to touch to activate the hand dryer. It also conserves energy as soon as you remove your hands. (Davies, 2014).

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