

Cost-Effectiveness and Sustainability of Individual v. Bulk Products Provided in Smith College Dining Halls



(Tim Noble and Sue Webster: “Dirty White Trash”)

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Abstract:

Smith College Dining Services is dedicated to sustainability and green practices, yet provides students with numerous individually packaged products such as creamers, butter and sugar. These generate a great deal of waste, which adds to environmental degradation. Through cost-benefit analyses of purchasing individually packaged products versus bulk products with dispensers it is clear that bulk purchasing is a fiscally responsible choice. Consideration of other factors, such as sanitary concerns, recycling options and dining staff work load, the choice between the two becomes more convoluted. Environmentally and fiscally, bulk products are the most effective choice, but each option needs to be investigated further before implementation is to occur.

Introduction:

It is well known among environmentalists that Americans are producing waste at exorbitant rates. It is estimated that each U.S. citizen creates approximately 4.39 pounds of solid waste each and every day.¹ Almost 1/3 of this generated trash is packaging.² Packaging is an essential part of many everyday products and much of the packaging is necessary for safety and sanitary reasons. The use of paper bags, for example, is useful when transporting sugar from farm to store to home. There would certainly be a greater loss of sugar without this use of packaging. However, using this packaging at the individual level, such as in dining halls, restaurants and gas stations, creates much more waste per pound of product.

The waste produced from this packaging is putting a strain on the resources and landfill capabilities of our world. US landfills are closing at an average rate of 1 per day, as they fill to capacity.³ This is evident at the local level here in Northampton, Massachusetts as the landfill is looking to expand beyond its current boundaries.⁴ This is a point of contention as the proposed expansion site is above an aquifer used for much of the areas drinking water.

¹ <http://www.cleanair.org/Waste/wasteFacts.html>

² <http://www.cleanair.org/Waste/wasteFacts.html>

³ <http://www.cleanair.org/Waste/wasteFacts.html>

⁴ <http://www.northamptonma.gov/dpw/Landfill/> and <http://www.savingparadise.info/>

While many people are concerned about this proposed expansion and are fighting to halt its occurrence, it is important to remember the root cause. The need for the landfill comes directly from the increase in consumer consumption and waste production. This trash inevitably needs a resting place, a problem in and of itself. This issue is generally hidden by our well-oiled trash collection agencies which work hard to pick up trash from our homes and businesses. This year Naples, Italy witnessed how quickly trash can pile up when it has no resting place. When the city's landfill reached capacity a number of issues pushed all new waste into the streets. For months the streets were filled with trash as the government struggled to find a compromise.⁵

In order to reduce the amount of trash produced, it is essential to think on an individual level. By reducing one's personal waste production there is the possibility of slowing the heavy waste stream into our landfills. Smith College produces the most per capita trash when compared with Mt. Holyoke, Hampshire and Amherst Colleges.⁶ A 2006-2007 study showed that Smith students produced 709.4 pounds of waste each year, compared with 444.1 pounds for Hampshire students, 488.8 pounds for Mt. Holyoke students and 625.1 pounds per Amherst student.⁷ It is clear that Smith can improve its sustainability efforts and can begin with waste reduction. This is a difficult proposition, yet one that is entirely possible. Through the perspective of waste reduction it becomes clear what individual steps can be taken.

The Smith College Dining Services has taken this step and strives to be as sustainable as possible. Dining Services manager, Kathy Zieja, regularly attends meetings with the managers from each of the area 5-colleges to discuss any leads they may have on

⁵ <http://edition.cnn.com/2008/WORLD/europe/01/07/naples.rubbish.background/>

⁶ <http://www.mtholyoke.edu/offices/es/8436.shtml>

⁷ <http://www.mtholyoke.edu/offices/es/8436.shtml>

new, green products.⁸ Each college faces unique challenges and Smith is no exception. With 15 dining halls on campus, each of varying size, there is no single change that will work best for all locations. This makes it difficult for food purchasing and delivery, as each dining hall needs differing amounts and types of products.

The school has done much to overcome these difficulties and works hard to reduce waste, as well as to support sustainability and the local economy. With local food purchases the college reduces transportation emissions, supports the local economy and ensures fresh produce. New biodegradable flatware and to-go containers are in use in all dining halls in an attempt to reduce plastic production and disposal. A full scale compost system is the dream of Zieja, but is not yet possible due to the amount of food waste Smith College produces. There are no farms in this area that could handle the large capacity of food and it is not sustainable, or feasible, to truck our waste to a remote location. Currently there is a trial compost system in place in two of the larger dining halls, Chase-Duckett and Cutter-Ziskind. The two Co-op houses, Tenney and Hopkins, also participate in the composting by carrying their waste to Cutter-Ziskind.

The dining halls also utilize bulk products as much as possible. Larger locations have condiment dispensers (new in 2006-2007) while the smaller locations use a combination of bowls and hand held dispensers. The condiments in the large dispensers include ketchup, mayonnaise and mustard. Other, less commonly used, condiments such as tartar sauce, parmesan cheese and relish are generally presented in bowls.

More recently, bulk cereal dispensers have been put into place. This provides incredible monetary and environmental savings. Prior to the bulk dispensers, every cereal was purchased in the 13-24 ounce, household size boxes. There were a variety of cereals

⁸ Personal Communication, Kathy Zieja, February 19th, 2008

in each dining location and they cycled throughout campus. With the dispensers, which are only in the more heavily frequented dining halls, the waste of the paperboard boxes and plastic linings has been reduced dramatically. There is currently no quantifiable data on this topic, but the dining and custodial staff attests to the reduction of waste.

There is always more that individuals and businesses can do to reduce waste production, and Smith Dining Services is no exception. While there are some bulk dispensers in place, there are many more individually packaged items found everyday. Products such as sugar, Splenda, Equal, creamer, butter, margarine, jelly, jam, cream cheese and peanut butter are found in every dining hall. In contrast to the previously mentioned condiments, some of these are found in bulk in the smaller dining halls while individually packaged in the larger ones. These items are generally the spreads for butter, such as butter, cream cheese, jelly, jam and peanut butter. It is not possible to do this at the larger locations due to sanitary concerns.

The environmental impact of these individually packaged containers is significant. Many of these are packaged in non-recyclable plastics with small amounts of the product. The infrastructure of Smith College dining halls is such that all this packaging ends up in the trash can, even if it is recyclable. In close proximity to each of the coffee/tea and toaster/bread areas there is a trash can, understandably.

Through the use of bulk dispensers, or possibly recycling containers, much of this waste could be reduced. Again, the unique dining system at Smith College makes implementation difficult, but the technology is beginning to meet the needs and wants of the environmentally conscious consumer. Through an investigation of the bulk versus

individually packaged products it is possible to expand upon the savings to the college, as well as to the environment.

Methodology:

Information for this research was gathered through direct communication with Smith College Dining Services employees. All data regarding the purchase of products was obtained from Patrick Diggins, the Food Buyer for Smith College. The data all refers to the amounts purchased for the 15 Smith College dining halls during the fall semester of 2007, from August 15th, 2007 through December 25th, 2007. Diggins also provided all prices for these products, as well as for the bulk product prices used for comparison purposes. Kathy Zieja, Director of Dining Services, provided much of the background information regarding sustainability efforts throughout the campus. Zieja also informed on where Smith purchased much of its dining services products.

The data provided by Diggins was used for both total consumption knowledge and cost analysis purposes. The amount used each semester of three products, sugar, creamer and butter, was determined for analysis purposes.

Sugar

Smith College orders two types of sugar packets, Domino and HPC, which cost the same, yet contain different amounts of sugar. Domino sugar packets hold 0.84 teaspoons while HPC packets hold 0.67 teaspoons. Information regarding how much sugar was in each packet was gathered from company websites and through measurement in the Albright House kitchen. This data, along with purchasing information from Diggins, was then used to determine how many pounds of sugar were consumed by students each semester.

Research into sugar dispensers occurred through Hubert Supply Company and further investigation online. The cost of each sugar dispenser was then calculated into the overall savings that could be sustained by Smith College. The most cost-effective choices were determined based on these results.

Butter

Smith College orders four types of butter patties, three from Grassland Dairy and one from Land O'Lakes. All four were analyzed as being the same cost per case. None of the containers, boxes or websites contained definitive information on the amount provided in each patty. An average of 0.5oz per patty was determined through direct discussion with dining workers and use of the Tyler Dining Room scale. This, along with the amount purchased by Diggins, provided an approximate amount of butter used by students each semester. Investigation into butter dispensers was done via Hubert Company and the internet. This data, along with the comparison of bulk versus individually packaged butter patties, provided the necessary information for cost-effective analysis.

Creamer

Smith College orders 2 types of creamers, half and half and aseptic creamers. Aseptic creamers refer to a process and packaging that allows the product to have a long shelf life while remaining unrefrigerated. Therefore, the half and half costs less at \$8.56 20 per case while the aseptic creamers cost \$12.60 per case. This data, along with the amounts purchased supplied by Diggins, allowed for the calculation of how much Smith College spends on individually packaged creamers.

Again, the creamers did not specify how many fluid ounces were in each container. The delivery box also did not have this data and the internet provided sparse information. It was determined through measurement in Tyler Kitchen that each creamer holds about 3/8 of an ounce. This allowed for the calculation of how much creamer was used during the fall semester of the 2007-2008 school year.

Bulk creamer dispenser information was obtained through the Hubert Company as well as through online research. This provided further information on the cost-effectiveness and payback time each type of dispenser would entail.

Results:

Total Purchases

Smith College Dining Services caters to approximately 2,500 on-campus students every single day. Due to the use of individually packaged products in each of the 15 dining halls, this produces a lot of waste. The individually packaged products investigated here are sugar, creamers, butter, margarine, jam/jelly, cream cheese, Splenda and Equal. Each of these products is packaged differently and therefore produces different types and amount of waste, but it all inevitably ends up in the landfill due to the infrastructure of the dining halls.

Sugar, Splenda and Equal are all packaged in simple paper packets. Granulated white sugar produces the most waste, with 104,000 total packets consumed each semester. 32,000 Splenda packets and 46,000 Equal packets are also used every semester (See Table 1). According to Katya Erlij, Smith College Recycling Intern 2007-2008, these packets are easily recycled.⁹

⁹ Personal Communication, Katya Erlij, 4/28/2008

Creamers, butter, jam/jelly, cream cheese and margarine are typically packaged in plastic “cups”. These are made primarily of Hi-Impact Plastic Material, HIPS Polystyrene, which is not recyclable.¹⁰ In sum, Smith student dining halls produce 577,870 plastic containers each semester. This includes 69,600 creamers, 458,070 butter cups, 26,400 cream cheese cups and 17,400 jam/jelly cups (See Table 1).

Sugar Case Study

Sugar use is, as expected, fairly high in the Smith College dining halls due to the availability of coffee and tea at every meal. 104,000 packets are used every semester (See Table 1). 6000 of these packets are from Domino and contain 0.84 tsp of sugar per packet, which equals approximately 5040 teaspoons. 98000 packets, HPC brand, have 0.67 teaspoons per packet for a total of 65660 teaspoons. In sum, Smith uses about 70700 teaspoons of sugar in one semester. This is approximately 650 pounds of sugar. (See Table 3) Smith College spends \$458.64 on packeted sugar each semester. This averages out to be \$0.71/lb of sugar. Bulk sugar (purchased in 50lb bags) costs \$23.94, which is approximately \$0.48/lb. Purchasing 650 pounds of sugar at bulk, wholesale price would cost \$312. This could save Smith College \$146.64 each semester.

Dispensers vary in cost and size and need to be factored into the cost-analysis. Hubert Company sells small, 12 oz. sugar pourers at the price of \$64.49 for a case of 36 (See Figure 1). This equals about \$1.80 for the initial purchase of each sugar dispenser. With these dispensers, Smith College would still save \$82.15 during the first semester and the previously calculated \$146.64 each subsequent semester.

Another dispenser option is a machine from Supramatic Inc., based in Canada (See Figure 2). Each dispenser holds approximately 1200 sugar packets and allows for

¹⁰ Personal Communication, Beth Miner, GenPak, 5/06/08

portion control by doling out the amount from one packet each press. Each Supramatic machine costs \$425.00, creating a large initial investment for Smith College. If purchased for each of the dining halls, it would take almost 22 years to see a payback on the investment, assuming the savings continued in the same manner.

Butter Case Study

Butter produces the most waste of the individually packaged products, with 458,070 cups purchased each semester (See Table 1). This costs \$28,751 each semester for the 14,314.7 pounds of butter (See Tables 2 and 4). This means Smith College is paying approximately \$2.00 per pound of butter. The wholesale, bulk price for butter is \$67.09 for 36 pounds, which is approximately \$1.86 per pound. Purchasing bulk has the potential to save the college \$2,073.97 each semester (See Table 2).

There are no viable dispenser options for bulk butter in a dining hall. Placing the large sticks of butter in a bowl is an option that is sometimes utilized in the smaller dining halls. These bowls are already available and would not need to be purchased, but the sanitary concerns prevent this mode of distribution.

Creamer Case Study

Individual creamers are used in Smith College dining at a rate of 69,600 per semester, or about 600 each day. Each creamer contains approximately 3/8 ounce of half and half, meaning Smith consumes 204 gallons each semester (See Table 5). This costs the college \$1,752.04 at the individually packaged price. Bulk creamer is sold at \$6.78/gallon, in half gallon containers. Purchasing 204 gallons at this price would cost \$1383.12, for a total savings of \$368.92 each semester (See Table 2).

The bulk creamer would need dispensers for each dining halls. Option one would be to purchase half gallon, pourable containers of the creamer and keep it in ice chilled bowls. Option two would involve the purchase of Glass-lined Airpots from Hubert Company (See Figure 3). Each Airpot holds 2.5 liters, or 0.66 gallons and can keep liquids chilled for 8 hours. These could be filled with the ½ gallon bulk creamer and not spoil. Each Airpot costs \$61.39, for a total of \$920.85 if 15 were purchased. This option would allow for a one year payback, with savings of \$185.91 in the third semester and then \$368.92 each subsequent semester (see table 6). If 30 were purchased, to allow 2 per dining hall so that as one is being cleaned another is available, this would clearly double. Savings would take until the fifth semester (See table 6).

Tables and Figures:

Table 1: Total individual products ordered during Fall 2007			
	# of cases ordered	# of product per case	Total # of product
Sugar	52	2000	104,000
<i>Domino</i>	3	2000	6000
<i>HPC</i>	49	2000	98000
Creamers	174	400	69600
<i>Half and half</i>	109	400	43600
<i>Aseptic</i>	65	400	26000
Butter	796	----	458070
<i>LOL</i>	58	60	3480
<i>Grassland</i>	738	90	454590
Cream Cheese	264	100	26400
Jam/Jelly	87	200	17400
Margarine	14	600	8400
Splenda	16	2000	32000
Equal	23	2000	46000
Total Individual Packet Waste			761870

Table 2. Total Cost of Sugar, Butter and Creamer at Individual v. Bulk Cost (ignoring initial cost to purchase new dispensing equipment)				
	Cost per case	Total Cost/Semester	Total Bulk Cost	Total Savings/ Semester
Sugar	\$8.82	\$458.64	\$311.22	\$146.64
<i>Domino</i>	\$8.82	\$26.46		
<i>HPC</i>	\$8.82	\$432.18		
Creamers	-----	\$1,752.04	\$1,383.12	\$368.92
<i>Half and half</i>	\$8.56	\$933.04		
<i>Aseptic</i>	\$12.60	\$819.00		
Butter	\$36.12	\$28,751	\$26,677.03	\$2,073.97
<i>LOL</i>	\$36.12	\$2,094.96		
<i>Grassland</i>	\$36.12	\$26,656.56		

Table 3: Total Amount of Sugar Used by Pound during Fall 2007			
	Total Packets	Amount/packet	Total Pounds
Sugar	104,000		650
Domino	6,000	0.84 tsp	
HPC	98,000	0.67 tsp	

Table 4: Total Amount of Butter Used by Pound During Fall 2007			
	Total Cups	Amount/cup	Total Pounds
Butter	458,070	0.5oz	14,314.7

Table 5: Total Amount of Creamer Used by Gallon During Fall 2007			
	Total Cups	Amount/Cup	Total Gallons
Creamer	69600	3/8 fl. Ounce	204

Table 6: Cost-Benefit Analysis for Sugar, Butter and Creamer Dispensers in lieu of individually packaged products in Smith College Dining Halls

	Total Amount	Cost for Individually packaged product	Cost for Bulk	Savings per semester (with no dispenser purchase)	Cost of Dispensers	Savings in the third semester after dispenser purchase	Total savings after 2 years	Total savings after 10 years
Sugar	650 pounds	\$458.64	\$311.22	\$146.64		-----	-----	-----
Option one: Sugar Pourers					\$64.49 for 36	\$82.15	\$375.43	\$2721.67
Option two: Supramatic machine					\$425 for 1 \$6375 for 15	-\$6081.72 (loss)	-\$5788.44 (loss)	-\$4616.32 (loss)
Butter	14,314.7 pounds	\$28,751	\$26,677.03	\$2,073.97	-----	-----	\$8295.88	\$41479.40
No Dispensers available								
Creamer	204 gallons	\$1,752.04	\$1,383.12	\$368.92				
Option one: Use half/gallon jugs					N/A	-----	\$1475.68	\$7378.40
Option two: 15 Eco-Airpot dispensers					\$920.85	-\$186 (loss)	\$182.92	\$3134.28
Option three: 30 Eco-Airpot dispensers					\$1841.70	-\$372 (loss)	-\$3.08 (loss)	\$2948.28



Figure 1. Sugar pourers available from Hubert Company at \$64.49/case of 36.



Figure 2. Supramatic sugar dispenser available from Canada at \$425.00 per machine



Figure 3. Eco-Air Airpot from Hubert Company for creamer dispensing

Discussion:

Total Consumption

As previously mentioned, the overall waste produced by Smith College students can be, and should be, significantly reduced. The data illustrates that there are modest actions that can aid in this goal of waste reduction.

Sugar

Sugar usage cannot be eliminated from Smith College dining, but its environmental impact can be alleviated. The cost-benefit analysis revealed here shows that the sugar pourers from Hubert Company would be the most beneficial to the environment and the budget of Smith Dining. However, when determining the most effective choice for sugar purchasing it is important to consider factors beyond just cost

and waste produced. Other aspects to consider include sanitary concerns, increased work to dining/custodial staff, size of the dining hall, theft of the dispenser and portion control.

Sanitary concerns are essential in a college dining hall feeding busy, hungry and tired students. A bowl of sugar with a spoon is not sanitary due to the possibility of liquids falling into the bowl or the spoon being used as a stirrer. Zieja voiced both of these as valid concerns, so sugar dispensers or packets should be utilized. The packets, pourers and Supramatic machines can all be considered sanitary.

The size of the dining hall, however, also affects the choices made. With 15 dining halls of varying sizes it is impossible to make a stock choice for them all. The smaller dining halls would have difficulty with the Supramatic machine, as it would be unlikely that they would use such a large amount of sugar before it gathered moisture and became chunky. The pourers, likewise, would be difficult to use in a large dining hall as the dining staff would need to refill them often. Adding this to an already busy job may not be effective and could be frustrating to impatient students and staff alike.

Additionally, both the pourers and the Supramatics have a theft opportunity. The pourers are small and could be slipped into a bag for use in houses without dining, while the Supramatics do not have an off button. All other machines in the dining halls are switched off when dining is closed, but the Supramatic does not run on electricity, therefore cannot be turned off. This could lead to an increase in the use of sugar, thereby reducing or eliminating the savings made by purchasing bulk sugar. Another increase in the use of sugar could come from the use of pourers, as there is no portion control. The packets and Supramatics provide the user with a designated amount of sweetener, while the pourer makes portion size difficult to gauge.

With all these aspects weighing in, the decision becomes much more convoluted. The Supramatics would clearly not be a fiscally intelligent choice and can be vetoed as an all campus solution. The pourers, however, have strong points, but perhaps should be used on a trial basis before full implementation. These factors funnel down to a recommendation of trial Hubert pourers with recycling baskets for sugar packets in the remaining dining halls. The pourers should be tried in both a small dining hall, such as Northrop and a large dining hall, such as Chase-Duckett. Only with information from these trials should a full scale change be made, if at all.

Butter

Butter usage is clearly the largest of these three case studies. A student uses an average of 1.25 butter patties everyday, generating over 3000 butter cups in the trash. The use of bulk, stick butter can eliminate much of this waste, though it comes with its own concerns. Butter is unique in that there is no dispenser developed for use in dining halls, as there is for sugar and creamer. This leaves the only option as allocating the butter in small dishes in large stick form.

This is done in some of the smaller dining halls already, but is a sanitary concern. Through conversations with dining hall staff it became apparent that this method is not preferred, as the butter becomes contaminated quickly. Dining staff expressed concern about other foods, bodily fluids and hair becoming stuck in the butter. Therefore, butter that is not used by the end of the day would have to be thrown away, due to this contamination. This would increase the amount of butter consumed, possibly eliminating any savings incurred through bulk purchasing. Another increase that could be incurred through this change is again due to the lack of portion control. Similarly to the use of the

sugar pourers, a stick of butter allows the student to take more butter, which could end up being inefficient.

Overall, butter is the most difficult individually packaged product to eliminate due to a lack of bulk dispensers. While it would be helpful from a plastic waste reduction perspective to switch to bowls of butter, it could increase food waste and butter costs. It is not advisable to switch butter dispensation at this time.

Creamer

Creamers create a great deal of waste not just from Smith College dining, but from the innumerable gas stations dotting the world. With the increase in creamer variety, the individual packages have gained popularity. This increase, however, is a strain on the environment and this can partially be alleviated through actions at Smith College. The Hubert Eco-Air Airpots can eliminate the need for these small, non-recyclable cups.

Of these three case-studies, creamer can most easily be replaced with bulk dispensers. The most feasible option is that of the Hubert Airpots, because they are relatively inexpensive, medium sized and easy to maintain. There are creamer dispensing machines, similar to the Supramatic sugar dispenser, but they all have large capacities, are exorbitantly priced and many are only available in Canada. The Airpots, however, have the potential to decrease waste and are already in use in the Campus Center Café.

The difficulties with the Airpots come with the need to wash and refill them daily, which is an added job responsibility for dining staff. In addition, creamer that is not used by the end of the day may be wasted if it is simply poured down the drain. Between meals the Airpots should be placed in the refrigerator, yet there will be still be waste in the end. If this option is implemented there may be increased use of creamer due to this

waste or, again, due to the lack of portion control. Through further investigation it may be possible to find an Airpot that dispenses creamer in smaller quantities than this option. This Airpot from Hubert is originally intended for use with hot beverages such as coffee and tea, yet it also works for creamer, but will dispense at a high rate.

In sum, a switch to Airpots in the student dining halls could potentially save the college up to \$368.92 a semester, though this is not definite due to the uncertainties with portion control. It is advisable to try the Hubert Airpots in a select few dining halls to see if creamer usage increases and if it is worth the investment.

Conclusion

Ideally, all products at Smith College could be provided from bulk dispensers to reduce cost and waste, but this is not a reality. A school similar in size to Smith College with one or two dining halls would be able to more effectively implement these changes. Smith, however, derives so much of its character from its unique dining system that it would be impossible to even consider this option. By working with the receptive dining staff in each of the dining halls, finding creative solutions to the high waste output and becoming personally aware of every piece of packaging used, Smith College can become a more environmentally friendly campus.

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