

WHAT SUSTAINABLE PRACTICES EXIST IN COLLEGE AND UNIVERSITY DINING SERVICES?

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ABSTRACT

College and university dining services administrators (CUDSAs) were surveyed using a web-based questionnaire to determine sustainable practices in their operations. Results from 138 CUDSAs (26.4% response) indicated that the most frequently used sustainable practices included: recycling of fats, oils, grease, cardboard, white paper, aluminum, and newspaper; and use of recycled products such as napkins. CUDSAs reported that students, university administrators, and customers influenced their sustainable decisions and they were satisfied with their sustainability decisions but not with their resources. CUDSAs at private schools had implemented more practices and were more satisfied than were CUDSAs at public institutions.

Key Words: sustainable practices; college and university dining services; college and university dining services administrators

INTRODUCTION

Many concerns have been raised about sustainable characteristics of the current food system (Murray, 2005; Rimkus, Jones, & Ona, 2004). In order to provide large quantities, high quality, choices, and inexpensive food to more people, current industrial agriculture applies chemicals and pesticides that can cause toxins in groundwater and surface waters, and weaken soil quality. Moreover, those pesticides can harm human health (Tilman, Cassman, Mastson, Naylor, & Polasky, 2002). Increasing globalization has led to foods traveling long distances, increasing energy use and air pollution (Murray, 2005; Pirog, Pelt, Enshayan, & Cook, 2001).

According to the American Dietetic Association (2007), the future food supply needs to incorporate sustainability to ensure human and environmental health. A sustainable food system should provide society with (1) an affordable, safe, and nutritious food supply that people can purchase and access, and one that will not cause chronic illness; (2) foods grown in a way that is environmentally sustainable; and (3) a food system that provides economic and social value to rural and urban communities (W.K. Kellogg Foundation, n.d.).

Many higher education institutions are becoming environmentally responsible campuses, teaching students about degradation of the environment, encouraging students to seek sustainable practices, and serving as a role model in sustainability for students (Earl, Lawrence, Harris, & Stiller, 2003; Clugston & Calder, 1999). College and university dining services (CUDS) are part of these institutions' ecological footprint.

The literature has documented many different sustainable practices that have been implemented by CUDS (Bush, 2005; Eagan & Keniry,

1998; McIntosh, Gaalswyk, Keniry, & Eagan, 2008; Sustainability Endowment Institute, 2009). Yet limited research has been done documenting the prevalence of sustainable practices in CUDS. The objectives of this research were to (1) identify sustainable practices existing in CUDS, (2) determine whether sustainable practices differ based on demographic characteristics of schools, and (3) examine CUDS administrators' (CUDSAs) satisfaction level with their sustainable practices.

METHOD

This cross-section survey research project involved the use of a web-based questionnaire distributed nationwide to college and university dining services administrators (CUDSAs). The project was reviewed and approved by the university's Institutional Review Board prior to data collection.

Sample Selection

The research sample included all 555 CUDSAs in the United States who had an email address listed in the National Association of College & University Food Services (NACUFS) 2008 directory. Twenty of the administrators were randomly selected for the pilot test; the remainder (n=535) became the study sample.

Web Questionnaire

A web-based questionnaire was developed based on previous research (Horovitz, 2006; Sustainability Endowment Institute, 2008), trade journal articles, and CUDS websites. The questionnaire was reviewed by an eight-member expert panel of faculty and university foodservice managers to evaluate its clarity, content validity, and appropriateness of questions. A pilot test was conducted with a random sample of 20 CUDSAs. The questionnaire was modified slightly based on comments from the expert panel and pilot test participants.

The questionnaire included a list of 21 sustainable practices (See Table 1) that CUDSAs rated using a 7-point scale from 1 (never, not done in any of our dining operations) to 7 (always, done daily in more than 90% of our operations). CUDSAs indicated their satisfaction with their program's sustainable outcomes, amount of resources, and customer's reactions using a 7-point scale ranging from 1 (strong disagree) to 7 (strongly agree). CUDSAs also were asked to rate the degree of influence of nine constituent groups using a 7-point scale from 1 (no influence) to 7 (strongly influence). Examples of these constituent groups included dining personnel, faculty/staff, students, university administrators and foodservice management companies. Additionally, closed-ended questions asked the type of energy saving equipment purchased, if dining halls were Leadership in Energy and Environmental Design (LEED) certified, if educational materials or programs were offered to their customers, and if the concept of sustainability was included in their mission statement. Finally, demographic data for the CUDSAs, the dining services program, and the university were collected.

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Table 1: Practices in College and University Dining Services (n= 138)

Practices	Mean ^a	SD
1. Recycling fat, oil, & grease	6.53	1.16
2. Recycling cardboard	6.50	1.22
3. Using recycled paper products (e.g. napkins)	5.91	1.52
4. Selling bottled water ^b	5.90	1.43
5. Recycling white paper, computer printouts, etc	5.88	1.55
6. Recycling aluminum (e.g., cans, foil)	5.68	1.87
7. Using reusable tableware	5.54	1.72
8. Recycling tin cans	5.47	2.19
9. Recycling newspaper	5.43	1.94
10. Serving Fair Trade coffee	5.38	1.90
11. Recycling plastic products (e.g. plastic containers, plastic packaging)	5.33	1.96
12. Using refillable mug program for drinks	4.82	2.05
13. Using eco-friendly cleaning products	4.69	1.81
14. Using biodegradable disposable products	4.38	1.89
15. Serving sustainable seafood	3.99	2.00
16. Sharing unserved food with those in need	3.89	2.29
17. Serving organic foods	3.60	1.64
18. Operating trayless	3.47	2.27
19. Composting	3.07	2.34
20. Using Styrofoam cups ^b	2.67	1.90
21. Serving locally grown food	1.31	1.55
Average of practice score^c	100.41	17.68

^a Scale: 1 (never, not done in any of our campus dining operations) to 7 (always, done daily in more than 90% of our campus dining operations).

^b item reported original mean score. Item reverse coded when average of practice score computed.

^c Sum score for all 21 practices; possible score range 21 - 147.

As depicted in Table 2, the institutional characteristics for those who responded were similar to those of the NACUFS population of institutions. The results from non-parametric chi-square indicated that there was no difference between sample and population ($p > .05$) except status ($p = .045$). The sample for this study consisted of a greater proportion of CUDSAs from private schools than in the overall population (47.4% and 38.9%, respectively).

About two-thirds of the respondents were male (65.4%) and 72.8% were older than 45 years (Table 3). More than half (59.3%) had a bachelor's degree and 41.9% had held their position for less than five years. The majority of participants had attended sustainability workshops and provided educational materials to their students (76.6% and 86.2%, respectively). Of those who provided students with educational materials or programs on sustainability issues, 90.8% provided nutrition education, such as providing information or consulting to help students eat healthier diets, followed by food waste reduction education (69.7%), environmental awareness education (66.4%), and tours to farm programs (20.2%). About one-third of the respondents (37%) worked in institutions with student enrollment of fewer than 4,000, 33.8% were located in the Midwest, 63.2% had self-operated dining services, and 52.6% were associated with public institutions.

Results of χ^2 analysis suggested some differences based on institutional characteristics. Private institutions were more likely to have lower student enrollment (<4,000) than public institutions, schools in the Northeast had a greater percentage of schools with lower enrollment (<4,000), and schools in the West has a greater percentage of schools with larger enrollment (>12,000) as compared to the other regions, and schools with the smallest (<4,000) and largest enrollments (>12,000) were more likely to be self operated, while those of medium enrollment (4,000-12,000) were more likely to be contract managed.

Sustainable practices reported to occur most frequently in CUDS were: recycling fat, oil and grease; recycling cardboard; using recycled paper products; and recycling aluminum (Table 1). Sustainable practices least likely to occur were: serving locally grown food and

The distribution of the online questionnaire followed Dillman's (2007) suggestions. An invitation letter e-mail and a cover letter e-mail were sent within a one week period. Three follow-up e-mails were sent one week apart to help encourage response. Respondents were offered a summary of results to encourage participation in the project.

The Statistical Package for the Social Sciences (SPSS) Version 16.0 was used for all data analyses. Descriptive statistics (including means, standard deviations, and frequencies) were calculated. Chi-Square (χ^2) analyses were computed based on institutional characteristics. Independent samples *t* test and one-way Analysis of Variance (ANOVA) were used to compare mean responses based on demographic characteristics.

RESULTS AND DISCUSSION

Of the 535 CUDSAs contacted, 13 (2.4%) were undeliverable and were returned to the sender. The total number of responses was 138 resulting in a 26.4% response rate. The estimated value of standardized Cronbach's coefficient alpha was used to test internal consistency of sustainable practices section of the instrument. The standardized Cronbach's alpha value was 0.82 for the 21 sustainable practice items. Of the listed 21 practices, all were considered sustainable practices except serving bottled water and using Styrofoam cups. An average practice score was computed by summing the ratings for the 21 sustainable practices, creating a sustainable practice score ranging from 21 (never) to 147 (always). Since "serving bottled water" and "using Styrofoam cups" were not sustainable practices, the ratings for those two items were reverse coded prior to computing the sustainable practice score (Table 1).

Table 2: Institutional Characteristics of Participants (n=138)

Variable	Description	Frequency	Sample Percent	Population Percent ^a
Size of school	Under 4,000	50	37.0	38.0
	4,001-12,000	33	24.4	26.7
	Above 12,000	52	38.5	35.5
Region	Midwest	46	33.8	30.5
	Northeast	34	25.0	23.6
	South	26	19.1	26.5
	West	30	22.1	19.5
Type of management	Self-operated	84	63.2	62.7
	Contract Managed	49	36.8	36.9
Status	Private	63	47.4	38.9
	Public	70	52.6	61.1

^a Percent of the total population (N=555).

Table 3: Demographic Characteristics of College and University Dining Service Participants (n = 138)

Variable	Description	Frequency	Sample Percent
Gender	Female	47	34.6
	Male	89	65.4
Age	30 or less	2	1.5
	31-35	7	5.1
	36-40	10	7.4
	41-45	18	13.2
	46-50	34	25.0
	Over 50	65	47.8
Level of education	Bachelor	80	59.3
	Master	38	28.1
	Doctoral	1	0.7
	Other	16	11.9
Years working in current institution	<1-5	34	25.0
	6-10	28	20.6
	11-15	15	11.3
	16-20	21	15.4
	21-25	26	19.1
	More than 25	12	8.8
Years in charge	<1-5	33	24.3
	6-10	29	21.3
	11-15	18	13.2
	16-20	21	15.4
	21-25	17	12.5
	More than 25	18	13.2
Years in current position	<1-5	57	41.9
	6-10	33	24.3
	11-15	20	14.7
	16-20	12	8.8
	21-25	10	7.4
	More than 25	4	2.9
Attended sustainability workshop	Yes	105	76.6
	No	32	23.4
Provided educational materials	Yes	119	86.2
	No	19	13.8

composting. Participants indicated several sustainable practices that had been adopted within the past two years in their operations including composting ($n = 32$), trayless dining ($n = 28$), local purchasing ($n = 28$), purchasing biodegradable/ compostable service wares and containers ($n = 26$), recycling programs ($n = 16$), garden on campus ($n = 12$), eliminating Styrofoam and plastic usage ($n = 11$), purchasing organic foods/ beverages ($n = 10$), and recycling oil to biodiesel ($n = 10$). About one-third of the participants indicated that they adopted other sustainable practices not listed in the questionnaire, including selling reusable bags ($n = 4$), using a pulper ($n = 4$), and purchasing green products and cleaners ($n = 4$).

The frequent occurrence of waste reduction practices in CUDS is not surprising given the reports in the literature about foodservice operations implementing source-reduction activities because of increasing tipping fees, reduced landfill space, and regulatory mandates (Eagan & Keniry, 1998; Eagan, Keniry, Schott, Daynanada,

Jones, & Madry, 2008; Kim, Shanklin, Su, Hackes, & Ferris, 1997). Although there have been many CUDS programs profiled in the trade press for their purchase of organic and local products, composting, and trayless dining (ARAMARK Higher Education, 2008; Laux, 2006; Sustainability Endowment Institute, 2009), the actual occurrence of these practices was somewhat limited in this sample.

Eighty-nine percent of the participants ($n = 123$) indicated they purchased energy saving equipment for their operations, particularly light bulbs (78.3%), refrigerators (46.4%), and dish machines (41.3%). Approximately one-third (36.2%) of foodservice administrators ($n = 50$) indicated they have incorporated sustainability in their mission statements. As an example, the mission statement for the University of Massachusetts Dining states “the Mission of UMass Dining is to contribute to the campus life experience by providing a variety of healthy, flavorful food by serving local, regional and world cuisine in the most sustainable manner.” Some universities (14.5%) had dining halls that were certified as LEED buildings.

The U.S. foodservice industry spends an estimated \$12 billion on energy bills annually (Davies & Konisky, 2000; Davis, 1999). Therefore, it is not surprising to find that majority of CUDSAs purchased energy saving equipment. The limited number of LEED certified buildings could be due to the capital investment required for such certification, the relative newness of the certification process, and/or limited construction on college campuses.

Independent samples t tests and ANOVA were used to examine whether the sustainable practice score differed based on demographic characteristics of the program and the participants. No statistically significant differences were found in sustainable practice scores and level of satisfaction based on participants’ demographic characteristics (gender, age, and educational level). A few differences were found based on institutional characteristics (Table 4).

CUDS programs in private institutions had a significantly ($p < .01$) higher sustainable practice score (mean = 105.21 ± 15.33) than those in public institutions (mean = 96.11 ± 18.90). CUDSAs who provided educational materials and had attended sustainability workshops had a significantly ($p < .001$) higher practice score (mean = 103.22 ± 15.21 and mean = 103.27 ± 16.17 , respectively) than those who had not (mean = 82.79 ± 21.96 and mean = 91.44 ± 19.68 , respectively). CUDS programs located in the Northeast (mean = 108.88 ± 13.54) had a significantly ($p < .01$) higher score in sustainable practices as compared to CUDS programs located in the Midwest (mean = 97.22 ± 16.95) and South (mean = 93.88 ± 18.94). Interestingly, there was no difference in practice score based on enrollment ($p = 0.545$). Such results might suggest that sustainability efforts in CUDS are more closely linked to types of institutions and to sustainability efforts in regional locations than to institution size.

Private institutions might have had a higher sustainable practice score than public institutions because private institutions are less likely than public institutions to be facing inadequate funding and staff (McIntosh et al., 2008). This study found that the Northeast region had a higher sustainable practice score than other regions. This finding was similar to the study by McIntosh et al. (2008) that reported a higher sustainable grade for the East than other regions. The reasons for this finding might be schools in the East region are more likely to (1) focus on sustainability issues, (2) have sustainable policies, (3) hire personnel to manage sustainable issues on campus, (4) offer orientation or publications about campus-focused sustainability programs for faculty, staff, and students (McIntosh et al., 2008), and the Northeast region contained proportionately more private institutions than other regions.

Table 4: Demographic Traits Related to Sustainable Practices and Satisfaction (n = 138)

	Average Practice Score ^a Mean (SD)	Satisfaction Level ^b		
		Outcomes ^c Mean (SD)	Resources ^d Mean (SD)	Customers' reactions ^e Mean (SD)
Status				
Private	105.21 (15.33)	4.65 (1.38)	3.97 (1.69)	4.94 (1.32)
Public	96.11 (18.90)	4.30 (1.65)	3.59 (1.74)	4.41 (1.65)
t-value	3.03**	1.32	1.29	2.01*
Management type				
Self-operated	102.60 (17.62)	4.37 (1.60)	3.54 (1.77)	4.67 (1.54)
Contract managed	96.92 (17.93)	4.65 (1.44)	4.18 (1.59)	4.67 (1.52)
t-value	1.781	-1.02	-2.12*	-0.25
Provided educational material				
Yes	103.22 (15.21)	4.77 (1.41)	3.96 (1.72)	4.91 (1.41)
No	82.79 (21.96)	2.67 (1.14)	2.78 (1.48)	3.17 (1.34)
t-value	3.91***	6.06***	2.76**	4.90***
Attended sustainability workshops				
Yes	103.27 (16.17)	4.68 (1.48)	3.84 (1.81)	4.83 (1.50)
No	91.44 (19.68)	3.91 (1.61)	3.69 (1.47)	4.19 (1.49)
t-value	3.44***	2.52*	0.43	2.12*
Region				
Midwest	97.22 (16.95)	4.15 (1.38)	3.72 (1.63)	4.48 (1.55)
Northeast	108.88 (13.54)	4.59 (1.52)	4.21 (1.74)	4.91 (1.54)
South	93.88 (18.94)	4.46 (1.63)	3.85 (1.74)	4.80 (1.21)
West	101.60 (19.13)	4.87 (1.66)	3.53 (1.83)	4.68 (1.52)
F-value	4.63**	1.41	0.90	0.63
Overall Mean (SD)	100.41 (17.68)	4.50 (1.54)	3.80 (1.73)	4.68 (1.51)

p* < .05, *p* < .01, ****p* < .001^a Sum of all 21 practices (range from 1, never to 7, always); possible range in score 21 - 147.^b Scale: 1 (Strongly disagree) to 7 (Strongly agree).^c Overall, I am satisfied with the outcome of the current sustainable practices in my operation.^d I am satisfied with the amount of resources (e.g., labor and finances) I have to support sustainable practices in my operation.^e I am satisfied with my customers' reactions toward sustainable practices in my operation.

Participants were asked to rate their satisfaction with (1) the outcomes of sustainable practices, (2) the amount of resources available to support sustainable practices, and (3) their customers' reactions. In general, CUDSAs were satisfied with their outcomes of the current sustainable practices and their customer' reactions toward sustainable practices (mean = 4.50 ± 1.54 and mean = 4.68 ± 1.51). However, CUDSAs were slightly unsatisfied with the amount of resources they have to support sustainable practices (mean = 3.80 ± 1.73). Results from independent sample *t* test indicated that CUDSAs associated with private institutions indicated a significantly (*p* < .05) higher level of satisfaction from customers' reactions compared to those associated with public institutions (mean = 4.94 ± 1.32, mean = 4.41 ± 1.65, respectively). Also, CUDSAs with contract management companies had significantly (*p* < .05) higher levels of satisfaction with the amount of resources supporting sustainable practices as compared to CUDSAs of self-operated programs (mean = 4.18 ± 1.59, mean = 3.54 ± 1.77, respectively). Ratings for all three satisfaction items were found to differ significantly (*p* < .01) based on whether participants provided educational materials to their students; those who provided information were more satisfied than those who had not. Moreover, CUDSAs who had attended a sustainability workshop were more satisfied with sustainable outcomes and customers' reaction than those who had not (Table 4).

The results of CUDSAs' satisfaction level indicated the importance of providing educational materials and attending sustainability workshops when implementing sustainable practices. CUDSAs with contract management companies had higher satisfaction levels with the amount of resources available to support sustainable practices. This may suggest contract management companies provide CUDSAs

with support materials not readily available to CUDSAs in self-operated facilities.

Participants indicated that students, customers, and university administrators had the greatest influence on their sustainable decisions (Table 5). Independent samples *t* test and ANOVA results suggested several differences based on demographic characteristics. Students in the West (mean = 6.27 ± 1.14) had more influence than did students in the South (mean = 5.46 ± 1.36). University administrators, suppliers, and management companies had a stronger influence with contract managed CUDSAs (mean = 5.76 ± 1.01, mean = 3.87 ± 1.55, mean = 5.37 ± 1.68, respectively) than they did with self-operated CUDSAs (mean = 5.19 ± 1.53, and mean = 3.26 ± 1.63, mean = 1.53 ± 1.20, respectively).

In summary, implementing source-reduction activities is a trend in the foodservice operations. The findings of waste reduction practices in CUDS are somewhat similar to the trade press. However, the recent high profiled practices such as purchase of organic and local products, composting, and trayless dining seemed less practiced in CUDS programs than might be suggested by the trade press. Comparing sustainable practice scores, private institutions were more likely to have a higher practice score than public ones and the Northeast region had a higher practice score than other regions. The results are consistent with other findings that higher education institutions in the Northeast and the West have higher participation rates on waste reduction and conserving energy and students have a strong influence in sustainable practices (McIntosh et al., 2008).

Table 5: Influencer of constituent groups on foodservices' decision to implement sustainable practices (n = 138)

Variables	Influencers ^a								
	Students	Customers	Administrator	Personnel	Faculty/ staff	Suppliers/ venders	State/local government	Management company	Extension agent
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Region									
Midwest	6.15 (1.07)	5.74 (1.25)	5.52 (1.17)	4.74 (1.58)	4.74 (1.41)	3.30 (1.70)	3.37 (1.99)	2.76 (2.39)	2.60 (1.67)
Northeast	6.06 (1.01)	5.78 (1.09)	5.54 (1.50)	4.85 (1.74)	4.78 (1.39)	3.73 (1.65)	3.06 (1.84)	2.75 (2.07)	2.33 (1.47)
South	5.46 (1.36)	4.97 (1.40)	5.43 (1.19)	4.95 (1.52)	4.36 (1.26)	3.19 (1.54)	3.01 (1.43)	3.83 (2.45)	2.53 (1.55)
West	6.27 (1.14)	5.63 (1.13)	5.03 (1.63)	5.00 (1.53)	4.67 (1.39)	3.63 (1.52)	3.64 (2.06)	2.56 (2.22)	2.87 (1.72)
F-value	2.78*	2.77*	0.96	0.19	0.55	0.82	0.75	1.75	0.61
Management type									
Self-operated	5.97 (1.22)	5.50 (1.34)	5.19 (1.53)	4.89 (1.60)	4.54 (1.40)	3.26 (1.63)	3.10 (1.90)	1.53 (1.20)	2.49 (1.53)
Contract	6.14 (1.08)	5.73 (1.11)	5.76 (1.01)	4.92 (1.63)	4.93 (1.38)	3.87 (1.55)	3.67 (1.75)	5.37 (1.68)	2.76 (1.75)
t-value	-0.85	-0.99	-2.59*	-0.09	-1.57	-2.13*	-1.72	-14.03**	-0.92
Overall mean	6.04 (1.17)	5.60 (1.26)	5.40 (1.39)	4.89 (1.61)	4.67 (1.40)	3.48 (1.64)	3.31 (1.94)	2.89 (2.36)	2.58 (1.64)

* < .05, ** < .01

^a Scale: 1 (No influence) to 7 (Strongly influence).

LIMITATIONS

There are limitations to the study. The sample was drawn from a professional association (NACUFS) database; therefore, the results might not generalize to all CUDSAs in the U.S. The low response rate is another limitation of this study. Reasons for this low response are not known. Possibly, CUDSAs receive a large volume of email communication and discarded the email requests to participate in this study. The web questionnaire was sent out in late August. This may have impacted the response rate, if this was a busy time for CUDS administrators.

CONCLUSIONS AND APPLICATIONS

This study examined current sustainable practices existing in CUDS; the CUDSAs' satisfaction with the outcome; and the number of resources and customers' reactions to their sustainability efforts. Results showed that all 21 sustainable practices examined do exist to some degree in CUDS programs. The most widely used practices were recycling plastics, aluminum, cardboard, newspaper, and fat, oil and grease, and using reusable containers. More recently implemented practices include composting, trayless dining, local purchasing, and purchasing of biodegradable/ compostable service ware and containers. These results provide CUDSAs information about what other CUDSAs are currently doing and suggest sustainable practice benchmarks for their operations in the future.

Research is needed regarding how sustainable practices impact dining services' financial performance, student participation, and customer satisfaction. Evaluation is needed to determine resources needed to implement new sustainable practices. The effectiveness of educational materials and programs should be examined as well.

Findings from this study suggest that various constituent groups, particularly students, university administrators, and customers can influence CUDSAs' sustainable decisions. CUDSAs can proactively educate themselves by attending sustainability workshops and should involve students, university administrators, and customers in the planning for and implementation of sustainable practices.

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