Research Contribution

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CHALLENGES, BENEFITS AND STRATEGIES OF IMPLEMENTING A FARM-TO-CAFETERIA PROGRAM IN COLLEGE AND UNIVERSITY FOODSERVICE OPERATIONS

Siew-Lan Ng, MS, RD, LD[1]; Carolyn M. Bednar, PhD, RD, LD[2*]; Carol Longley, PhD, RD, LD[3]

[1]Clinical Dietitian, Hunt Regional Medical Center, Greenville, TX 75401
[2]Professor, Department of Nutrition & Food Sciences, Texas Woman's University, Denton, TX, 76204, USA
[3]Assistant Professor, Department of Dietetics, Fashion Merchandising, and Hospitality, Western Illinois University, Macomb, IL, 62455, USA

ABSTRACT

A survey was conducted using both online and mail survey methods to investigate college/university foodservice (CUF) administrators' perceptions about challenges, benefits, and strategies regarding farm-to-cafeteria (FTC) programs. Data included demographics of CUF administrators and their foodservice operations, agreement ratings of challenges and benefit statements, and importance ratings of strategies that affect the success of FTC. Challenges included availability, adequacy, menu planning, space, procurement, price, and administration. Benefits included connection to local community, public image, sustainability awareness and local economy. Important strategies included reasonable price, buyers and sellers relationships, back-up plan, student education, and local agricultural organization relationships.

Keywords: College/university foodservice administrators, farm-to-cafeteria programs, challenges, benefits, strategies

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INTRODUCTION

Sustainability of food and agricultural resources has become an important issue nationally and globally. The 2006 Environmental Scan of the American Dietetic Association (ADA) predicted that public interest in local food production would increase as the cost of energy boosted transportation expenses (Jarrat, J., & Mahaffie, J.B., 2007). The Scan also predicted that interest in fresh and organic foods would continue to grow. A 2007 ADA Position Paper recommended that foodservice managers promote ecological sustainability by purchasing foods direct from local growers and purchasing food produced with fewer agricultural inputs (Harmon, & Gerald, 2007).

The idea of farm-to-school programs was born in 1996-1997 when several pilot projects began in California and Florida (Eschmeyer, 2008). Since then, various schools, colleges, and universities have taken the initiative to implement farm-to-school or farm-to-cafeteria (FTC) programs. These programs allow operators to procure fresh locally grown farm products with the objective of serving healthier meals. There are currently over 2,000 farm-to-school programs involving K-12 schools in the United States (U.S.) (Joshi, & Azuma, 2009). There are over 150 farm-to-cafeteria programs involving colleges or universities in the U.S. and Canada (Community Food Security Coalition, 2010). Colleges and universities in California, Indiana, Iowa, Montana, New York, Ohio and Wisconsin have been cited as examples of successful FTC programs (Oklahoma Food Policy Council, 2003; Schuster, 2009).

In the U.S., there are 4,409 degree-granting colleges and universities (National Center for Education Statistics, 2009), and the majority of these have foodservice operations providing meals to their students. FTC programs are a key element in sustainable college and university foodservice (CUF) operations which encompass other types of programs such as recycling, composting food waste, using biodegradable utensils and plates, and organizing community gardens (Beitenhaus, 2008). Education regarding the benefits of local, seasonal, and organic foods to consumers and institutions has been recommended as an evidence-based strategy to build community food security (McCullum, Desjardins, Kraak, Ladipo, & Costello, 2005). Winne (n.d.) defines local food as food produced within the state or sub-region where a school district is located.

A survey of college/universities participating in FTC programs indicated that 25.4% of local products come from the same city/ county, 45.7% within a 50-200 mile radius, 25.4% from within the state or region, and 3.5% from unknown sources (Community Food Security Coalition, 2010). Purchasing locally grown foods may provide CUF operations with an alternative economical method of acquiring fresh and healthy foods for their students. Strohbehn and Gregoire (2005) advocated purchasing local foods as a means "to support regional economies, provide fresher and higher quality food, good public relations, availability of safer food and ability to purchase smaller quantities" (p. 2).

Foodservice operators who wish to procure local foods for menus may face several issues, challenges, or barriers. These include federal and state procurement regulations, concern about food safety, coordinating purchase and delivery of products from local growers, availability of local food products in appropriate quantities, seasonality of local products, increased product prices, and food preferences of students (Bellows, Dufour, & Bachmann, 2003; Community Food Security Coalition, 2010; Izuma, Rostant, Moss, & Hamm, 2006; Schuster, 2009; United States Department of Agriculture [USDA], 2005). According to a survey conducted by the Community Food Security Coalition (2010), the most frequently cited benefits of FTC programs were supporting the local farmers, community, and economy; higher quality food; lower environmental impact; and improved school and/or company public relations. A qualitative study of seven farm-to-school programs revealed three major reasons for serving local foods: "the students like it," "the price is right," and "we're helping our local farmer" (Izumi, Alaino, & Hamm, 2010, p.85).

A USDA-Food and Nutrition Service (2005) report stated that learning from the experiences of established programs is one successful strategy for implementing a new farm-to-school program. Hence, identification of problems faced and resolved while implementing FTC programs will make the process easier for other foodservice directors. The purpose of this study was to evaluate perceptions of CUF administrators about challenges, benefits, and strategies related to FTC operations and to share this information.

*Corresponding Author: Phone: (940) 898-2658; E-mail: cbednar@mail.twu.edu

METHODS

All methods used in this study received prior approval by a university Institutional Review Board.

Instrument

A questionnaire was developed based on a review of the literature and telephone interviews with three university foodservice directors who had implemented FTC programs.. The questionnaire was validated by six individuals including educators and college/university foodservice administrators. Revisions were made according to their suggestions.

Ten college/university foodservice directors participated in a pilot study to test reliability of the questionnaire and estimate time needed to complete the survey. Cronbach alpha analyses was used to test inter-item reliability of questions that used a Likert-type scale. After several statements were removed, the questions met research standards for reliability as follows: Local product supply and distribution methods ($\alpha = 0.685$, $n = 5$); Foodservice operation ($\alpha = 0.887$, $n = 6$); budget and purchasing ($\alpha = 0.827$, $n = 8$), administrative support ($\alpha = 0.868$, $n = 4$); benefits ($\alpha = 0.877$, $n = 8$); and strategies ($\alpha = 0.835$, $n = 14$). The final questionnaire gathered demographic information for foodservice administrators and operational characteristics. Participants were asked to evaluate a list of 45 statements related to local product supply and distribution methods (5), foodservice operation (6), budget and purchasing (8), administrative support (4) and benefits (8) using a 5-point Likert-scale (1=Strongly Disagree to 5=Strongly Agree). Participants assessed strategies (14) using a 5-point Likert-scale (1=Not at all important to 5=Extremely Important).

Sample and Data Collection

A sample of college/university foodservice administrators who were voting delegates of the National Association of College and University Food Services (NACUFS) was obtained. Due to a limited research budget and the increased postage cost of mailing outside the U.S., delegates from Canada, Mexico, and Taiwan were excluded from the study. The researchers also felt that production and purchasing practices would likely be quite different outside the U.S. Five-hundred thirty-eight administrators were invited to participate in the survey by a formal mailed letter with a direct web address to the online survey. PsychData software was used to manage the online survey. Two weeks after the letter mailing, 493 paper surveys were mailed to those who had not yet responded. Reminder postcards were mailed to administrators approximately two weeks following the paper survey, and administrators also received an email reminder each week for six consecutive weeks.

A $25 gift card was mailed to the participants of the three initial telephone interviews. All other participants were included in a drawing for one of four $25 gift cards.

Fifteen online surveys were unusable because participants answered only one question. A total of 24 paper surveys and 75 online surveys were completed. Thus 99 college/university foodservice administrators completed the study for a response rate of 19%.

Statistical Analyses

SPSS for Windows (Version 15.0, 2006, SPSS Inc., Chicago, IL) was used to summarize and analyze data. Descriptive statistics were used to summarize demographics of foodservice directors and characteristics of foodservice operations. Analysis of variance (ANOVA) was used to analyze differences between implementation of an FTC program, type of food production, location of foodservice operation, and the following variables: local product supply and distribution method, foodservice operation, budget and purchasing, administrative support, benefits, and strategies of implementing an FTC program.

RESULTS AND DISCUSSION

Demographics

The majority of respondents had more than 15 years of experience in foodservice and a bachelor's degree or higher. One-third were located in the Midwest region that included Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, Ohio, and Wisconsin (Table 1). A higher participation rate from these states may indicate greater interest in FTC implementation in that region.

About three-fourths (n = 75) of the operations were self-operated and one-fourth (n = 24) were contract-managed. Over half of the facilities (44 self-operated and 13 contract-managed) were implementing FTC programs. Operations that administered FTC programs purchased 17% of their products locally and 72% from foodservice distributors. The most frequently purchased local products included fresh fruits and vegetables followed by milk and cheese, beef, poultry, and other products such as honey, pork, and seafood. Self-operated operations may have fewer limitations in implementing FTC compared to contract managed operations which have corporate purchasing policies and annual purchasing contracts. However, this study found no relationship between types of foodservice management and implementation of FTC.

Table 1. Demographic Characteristics of Respondents and Foodservice Operations

No. of Years in Foodservice	n	No. of Years in CUF	n
≤5 years	6	≤5 years	14
>5 years-10 years	3	>5 years-10 years	13
>10 years-15 years	7	>10 years-15 years	10
>15 years	82	>15 years	61
Level of Education		**Regional Location**	
High school	2	Continental	12
Some college	6	Mid Atlantic	14
Associate's degree	15	Midwest	33
Bachelor's degree	52	North East	14
Master's degree	23	Pacific	14
Doctoral degree	1	Southern	12
Management Type		**Production Type**	
Contract management	24	Conventional	94
In-house or self-operation	75	Assembly-serve	49
		Central production	41
Implementation of FTC Program		Cook-chill	19
		Other	5
Yes	57		
No	42		

Types of food production used by respondents in this study included conventional (94), assembly-serve (49), central production (41), and cook-chill (19). Many indicated using two or more types of production methods. Five respondents indicated other production types included convenience store, display cooking and grab and go. The average number of students enrolled at these colleges/universities was

12,241, and 78% were considered full-time students. The average number of meal plans sold for fall semester 2008 was 3,258, and average number of meals produced in seven days was 27,622. An average of 93 full-time employees and 114 part-time employees were employed at these operations.

Challenges to Implementing FTC Programs

Challenges to implementing FTC programs were categorized as local product supply and distribution methods, foodservice operation, budget and purchasing, and administrative support. Challenges that received the highest levels of agreement included "Local farmers do not have enough supplies to meet our institution's needs," "Local products in our area are more expensive than products purchased from foodservice distributors," "Ordering and payment procedures for farmers are not efficient compared to foodservice distributors," "Purchasing local products will increase my institution's production costs," and "Products needed by my institution are not available from local farmers." The mean level of administrators' agreement with these challenge statements is shown in Table 2 in order of highest to lowest levels of agreement within categories. Table 2 also compares responses from those administrators who had implemented FTC programs with those who had not. For 22 of the 23 statements, administrators who had not implemented FTC had higher levels of agreement concerning challenges to implementing FTC programs. One-way Multivariate Analyses of Variance (MANOVA) and univariate analyses showed there was not a significant difference in level of agreement between those who had implemented an FTC program and those who had not concerning five statements about local product supply and distribution methods, but that there were significant differences in the other three categories.

Those who had not implemented FTC had higher levels of agreement that product storage space, limited skills of staff, and type of food production were challenges to implementing an FTC program. Administrators who utilized other types of food production (assembly -serve, central kitchen, and cook-chill) were also more likely to agree that lack of skilled staff to prepare local products, type of food production, and lack of storage space would prevent implementation of FTC programs. Assembly-serve production, which uses convenience products that only need to be reheated and served, would not be compatible with FTC methods. Cook-chill and central kitchens also might require larger quantities of products that would be available locally. Furthermore, the design of cook-chill and central kitchens might make it less feasible to process and store local products. Lack of facilities and staffing to handle and prepare local products were listed as barriers to FTC programs by Michigan school foodservice directors (Izuma et al., 2006). The Oklahoma Food Policy Council (2003) also reported "lack facilities to handle large amounts of fresh produce" as one of the challenges to purchasing local foods.

Challenges related to budget and purchasing may also hinder foodservice administrators from implementing FTC. Those administrators who did not have an FTC program had significantly higher agreement ($p = 0.002$) that the institution's purchasing policies did not allow purchase of local products. This indicates that purchasing policies could be a barrier to implementation of an FTC program for some colleges and universities. In a survey of 383 K-12 Michigan school foodservice directors, 71% indicated that federal and state procurement regulations were a barrier that could prevent purchasing foods directly from local producers (Izuma et al., 2006). Foodservice administrators who had not implemented FTC programs also showed higher level of agreement ($p = 0.021$) that they did not have enough customers to support the purchase of local products. This indicates that marketing FTC programs to student customers may be necessary in order to increase the sale of meals that incorporate local products. Markley (2002) also reported price, delivery, distribution, product consistency, product availability, and product volume as barriers listed by foodservice directors for starting farm-to-college projects.

Administrative support including adequate staff to maintain FTC and support from the institution may encourage the implementation of FTC programs. Foodservice administrators who had not implemented FTC programs had significantly higher level of agreement that lack of institutional support ($p = 0.001$), limited access to resources on how to start an FTC program ($p < 0.001$), and lack of technical support from community and government agencies concerning local purchases ($p<0.001$) were challenges. Administrators of colleges/universities play an important role in granting the permission to start an FTC. Resources on how to start FTC programs are available, although they are not easily accessed. Some resources may cost a small fee to obtain, while other resources required large amount of time to research. Technical support from community and government agencies may include setting an agreement or contract between foodservice operations and local farmers, finding reliable sources of local products, and building appropriate facilities to store local products.

Benefits of FTC Programs

Administrators in this study tended to have a high level of agreement with eight statements concerning the benefits of FTC programs (Table 3). Those benefits that rated the highest were helping a college/ university connect to the local community, improving the public image of a college/university, increasing sustainability awareness among students, increasing sustainability awareness among faculty and staff, and stimulating and benefiting the local economy. A MANOVA and ANOVA were used to compare responses between administrators who had implemented an FTC program and those who had not. Those who had implemented FTC programs had significantly higher levels of agreement with the benefits of providing a reliable local market for farmers ($p = 0.003$), connecting to the local community ($p = 0.025$), and improving public image ($p = 0.043$). Other studies have documented the benefits of implementing FTC including a dependable market for farmers and the opportunity for sustainability education for students (Bellows, Dufour, & Bachmann, 2003; Markley, 2002).

Strategies for Success of FTC Programs

Participants were asked to rate the importance of 14 strategies that may affect success of an FTC program (Table 4). The five strategies rated most important were developing a back-up plan when local products are not available, finding a source for reasonably priced local products, establishing relationships with local agricultural organizations, maintaining good relationships between buyers and sellers, and educating student customers about the program. An ANOVA revealed that administrators who had implemented FTC programs rated three of the strategies as significantly more important than those who had not implemented such programs. The three strategies included beginning a FTC program by introducing one or two local farm products at a time ($p = 0.017$), maintaining good relationships between buyers and sellers ($p = 0.017$), and educating student customers about the program ($p = 0.021$).

The majority of administrators who had implemented FTC programs were self-operated foodservice operations which means they may have opportunity to purchase increased amounts of local products. Furthermore, the appropriate types of local products must be available to meet the requirements of these foodservice operations. A good relationship between the buyer and seller will assist in finding local products in terms of quality, quantity, and competitive price.

Table 2. Differences in CUF Administrators' Mean Level of Agreement with Challenges Statements Based on FTC Program Implementation

Challenges Statements	FTC Program[b]	No FTC Program[b]	*p*[c]	Overall Mean ± SD
Local Product Supply and Distribution Methods	**n[a] =53**	**n[a] =33**		
Local farmers do not have enough supplies to meet our institution's needs	3.60	3.79	0.513	3.67 ± 1.26
The products needed by my institution are not available from local farmers	3.06	3.52	0.081	3.23 ± 1.18
Local farmers will not provide delivery to our institution	2.98	3.36	0.157	3.13 ± 1.22
Local products need more preparation compared to products purchased from foodservice distributors	2.91	2.97	0.823	2.93 ± 1.28
Our local sources have a low level of food safety protection	2.60	3.03	0.072	2.77 ± 1.07
Foodservice Operation	**n = 57**	**n = 40**		
It is difficult for me to plan menus based on seasonality of crops	2.77	2.85	0.729	2.80 ± 1.09
My institution does not have enough space to store local products	2.19	2.85	0.004**	2.46 ± 1.13
My institution has limited foodservice staff to prepare local products	2.16	2.55	0.104	2.32 ± 1.17
My institution has limited equipment to prepare local products	1.93	2.20	0.141	2.04 ± 0.89
My foodservice staff has limited skill to prepare local products	1.84	2.20	0.024*	1.99 ± 0.77
The type of food production used by my institution prevents me from preparing local products	1.79	2.25	0.002**	1.98 ± 0.74
Budget and Purchasing	**n = 54**	**n = 35**		
Local products in our area are more expensive than products purchased from foodservice distributors	3.44	3.43	0.949	3.44 ± 1.13
Ordering and payment procedures for farmers are not efficient compared to foodservice distributors	3.35	3.57	0.401	3.44 ± 1.20
Purchasing local products will increase my institution's production costs	3.24	3.43	0.444	3.31 ± 1.12
I find that it is difficult to place orders with multiple vendors	3.02	3.06	0.890	3.03 ± 1.27
Purchasing local products will increase my institution's transportation costs	2.59	2.89	0.179	2.71 ± 1.00
My institution does not have enough funding to purchase local products	2.43	2.46	0.890	2.44 ± 1.03
My institution's purchasing policies do not allow me to purchase local products	2.04	2.77	0.002**	2.33 ± 1.11
My institution does not have enough customers to support purchase of local products	1.80	2.20	0.021*	1.96 ± 0.81
Administrative Support	**n = 55**	**n = 36**		
My institution has limited staff to organize and maintain a farm-to-cafeteria program	2.95	3.28	0.171	3.08 ± 1.13
I do not have the technical support from community and government agencies to purchase locally	2.18	3.19	<0.001***	2.58 ± 1.00
I have limited access to the resources on how to start a farm-to-cafeteria program	1.98	2.89	<0.001***	2.34 ± 0.97
My institution does not support the idea of a farm-to-cafeteria program	1.60	2.11	0.001**	1.80 ± 0.73

[a]The actual number of respondents varied due to missing or invalid data.
[b]A Likert-type scale was used as follows: 1 =Strongly Disagree, 2 =Disagree, 3 =Neutral, 4 =Agree, 5 =Strongly Agree
[c]Results for Analyses of Variance of administrators' perceptions based on implementation of an FTC program; * p<0.05, ** p<0.01, *** p<0.001

Table 3. Differences in CUF Administrators' Mean Level of Agreement with Benefit Statements Based on FTC Program Implementation

Benefit Statements	FTC Program[b] (n=56)	No FTC Program[b] (n=37)	p[c]	Overall Mean[b] ± SD
A farm-to-cafeteria program helps a college/university connect to the local community	4.50	4.19	0.025*	4.38 ± 0.66
A farm-to-cafeteria program improves the public image of a college/ university	4.45	4.16	0.043*	4.33 ± 0.66
A farm-to-cafeteria program increases sustainability awareness among college/university students	4.41	4.16	0.112	4.31 ± 0.74
A farm-to-cafeteria program increases sustainability awareness among college/university faculty and staff	4.34	4.05	0.080	4.23 ± 0.77
A farm-to-cafeteria program stimulates and benefits the local economy	4.21	4.22	0.990	4.22 ± 0.75
A farm-to-cafeteria program provides more healthful foods for customers by offering local products	3.79	3.59	0.373	3.71 ± 1.01
A farm-to-cafeteria program increases consumption of fresh fruits and vegetables	3.55	3.35	0.330	3.47 ± 0.97
My institution provides a reliable market for local farmers	3.68	3.08	0.003**	3.44 ± 0.96

[a]The actual number of participants varied due to missing or invalid data.
[b]Likert-type scale was used as follows: 1 =Strongly Disagree, 2 =Disagree, 3 =Neutral, 4 =Agree, 5 =Strongly Agree
[c] Results for Analyses of Variance of administrators' perceptions based on implementation of an FTC program; * p<0.05, ** p< 0.01.

Administrators that use conventional food production also had a higher level of agreement with the strategy concerning finding a source for reasonable priced local products. This indicates that local products that are competitively priced will more likely be purchased by college/university foodservice administrators.

CONCLUSIONS AND APPLICATIONS

Administrators with FTC programs had higher over-all levels of agreement concerning program benefits; perhaps these administrators could encourage and mentor others who are facing challenges in implementing FTC programs. Administrators perceived that maintaining good relationships with local sellers including farmers was an important strategy for FTC programs. In addition, educating student customers and marketing the FTC program to the college/university and community will increase the level of success of the program. Students may begin to purchase more meals and support the implementation of FTC programs after gaining more information about them. Foodservice operations may then increase their revenue and have larger budgets to operate FTC programs.

In summary, the most frequently identified challenges of implementing FTC included availability of local product in appropriate quantities to meet demand, menu planning based on the seasonality of local products, storage space, efficiency of ordering and payment procedures for farmers, competitive priced local products, production cost, and adequate staff for FTC administration. The most frequently identified benefits of implementing FTC in CUF operations included connection to local community; improved public image; increased sustainability awareness among students, faculty and staff; and stimulated local economy. The top five strategies rated as most important to the success of FTC programs included "Developing a back-up plan when local products are not available," "Finding a source for reasonable priced local products," Establishing relationships with local agricultural organizations," "Maintaining good relationships between buyers and sellers including farmers," and "Educating student customers about the program."

Study participants were limited to voting delegates of NACUFS and results may not be generalized to overall CUF operations in the U.S. and Canada. The members of NACUFS represent only about 18% of the total of public and private institutions of higher education. The low response rate (19%) of this study may also be a limiting factor in application of its results. In addition, more members from the Midwest than other areas of the country participated in this study.

Future research might focus on investigating what local foods can most successfully be incorporated in college/university menus and what type of promotions and education are effective in encouraging students to select menu items made from local products. Researchers might also ask students if they would eat more meals at dining facilities if local foods were served. Other programs related to sustainability including recycling, composting and campus gardens could also be investigated.

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Table 4. Differences in CUF Administrators' Mean Rating of Importance of Strategy Statements Based on FTC Program Implementation

Strategy Statements	FTC Program[b] (n[a] = 57)	No FTC Program[b] (n[a] = 42)	*p*[c]	Overall Mean[b] ± SD
Developing a back-up plan when local products are not available	4.39	4.52	0.241	4.44 ± 0.58
Finding a source for reasonable priced local products	4.42	4.45	0.783	4.43 ± 0.56
Establishing relationships with local agricultural organizations	4.33	4.31	0.862	4.32 ± 0.67
Maintaining good relationships between buyers and sellers including farmers	4.40	4.14	0.017*	4.29 ± 0.54
Educating student customers about the program	4.35	4.05	0.021*	4.22 ± 0.65
Marketing the program to my college/university and the community	4.25	4.10	0.202	4.18 ± 0.58
Getting support from upper administration	4.16	3.88	0.127	4.04 ± 0.89
Establishing relationships with other foodservice organizations that purchase local farm products	4.04	4.02	0.935	4.03 ± 0.68
Obtaining adequate funding from my organization	4.04	3.76	0.131	3.92 ± 0.89
Beginning a small farm-to-cafeteria program by introducing one or two local farm products at a time	4.05	3.71	0.017*	3.91 ± 0.70
Maintaining adequate skilled staff to prepare the local products	3.91	3.90	0.964	3.91 ± 0.81
Assessing whether students customers are interested in purchasing local farm products	3.84	3.95	0.483	3.89 ± 0.77
Arranging foodservice administrator visits to local farmers' markets	3.95	3.69	0.117	3.84 ± 0.80
Organizing a food advisory committee	3.54	3.57	0.889	3.56 ± 0.96

[a] The actual number of participants varied due to missing or invalid data.
[b] A Likert-type scale was used as follows: 1 =Not at all Important, 2 =Not Important, 3 =Neutral, 4 =Important, 5 =Extremely Important
[b] Results for Analyses of Variance of administrators' perceptions based on implementation of an FTC program; p<0.05.

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WHO WILL DIRECT HOSPITAL FOODSERVICE DEPARTMENTS IN THE FUTURE?

Mary B. Gregoire, PhD, RD, FADA[1*]; Karen R. Greathouse, PhD, RD[2]

[1]Professor and Director of Food & Nutrition Services, Rush University Medical Center, Chicago, IL 60612, USA

[2]Professor and Chair, Department of Dietetics, Fashion Merchandising & Hospitality, Western Illinois University, Macomb, IL 61455, USA

ABSTRACT

This study explored the expected need for, succession planning strategies used, and qualifications expected of future hospital foodservice directors. Results from 122 (17% response) foodservice directors suggested more than half (59%) of the current foodservice directors will retire within the next 10 years. Succession planning for the foodservice director position occurs in some (41%) hospitals. Credentials required for the foodservice director position in the future include BS degree (90%), foodservice (70%) and foodservice director (64%) experience, and skills including verbal/written communication (87%), team leader (86%), foodservice operations management (86%), customer satisfaction (79%), financial management (77%), change management (71%), and human resource management (66%). Less than half (41%) of respondents indicated that the RD credential would be required for future hospital foodservice directors.

Keywords: hospital foodservice, succession planning

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INTRODUCTION

Onsite foodservice operations, including hospitals, provide meals daily to a captive audience of customers in their facilities; sale of food is secondary to the overall mission of the organization in which the foodservice operation exists (Gregoire & Spears, 2007). Hospital foodservice operations generated more than $13.1 billion in sales during 2006 (In the money, 2007).

The American Dietetic Association (ADA) promotes registered dietitians as managers of choice for hospital foodservice operations. Statements in an ADA position paper indicate: "effective management of health care food and nutrition services is best accomplished by dietetics professionals with competence in management; foodservice systems, including food science, safety, and quality; and nutrition in health and disease, including medical nutrition therapy."(American Dietetic Association, 1997)

Despite ADA support of the RD managing hospital foodservice operations, less than half of these departments are managed by RDs. In 2000, Silverman, Gregoire, Lafferty, and Dowling indicated 38% of directors in hospitals with more than 200 beds were RDs and in 2005, Gregoire, Sames, Dowling, and Lafferty reported 48% of hospital (all sizes) had foodservice directors who were RDs.

The predicted retirement in the next 10 years of current baby boomer -aged directors is a concern in onsite foodservice operations (Schechter, 2007). A recent article in *Food Management* magazine indicated that management companies alone are seeking more than 5,000 entry-level and mid-level managers for non-commercial foodservice positions (Schuster, 2005). One strategy to prepare for these upcoming retirements suggested by Lipowski (1999), is use of careful succession planning combined with medium-term retention plans.

Garman and Tyler (2007) defined succession planning as "a structured process involving the identification and preparation of a successor, for a given organizational role, that occurs while that role is still filled." Garman and Tyler's study of health care organizations found only 21% of health care institutions indicated routine use of succession planning for their administrators.

The importance of qualified directors for hospital operations and the predicted retirement of current directors supports the exploration of succession planning strategies that are or could be used to prepare the next generation of foodservice directors. Additionally, research is needed to determine the credentials expected of hospital foodservice directors in the future. Specific objectives of this study were to:

1. Determine the expected openings for foodservice director positions because of retirements of current directors in hospitals with 100 or more beds.
2. Examine succession planning techniques currently being used in hospitals with 100 or more beds.
3. Identify credentials and qualifications that may be required of hospital foodservice directors in the future.

METHOD

Study Approval

This survey research project involved data collection using a mailed questionnaire. The study protocol and instruments were approved by the university's institutional review board prior to data collection.

Sample

Data were collected from two different samples for this study: hospital foodservice directors and hospital executives. Mailing labels for a random sample of 700 acute care, not psychiatric or pediatric hospitals with 100 or more beds, were purchased from the American Hospital Association.

Instrument Development

A multi-section, three-page questionnaire was developed for this study based on previous research by Garman and Tyler (2007), Gregoire et al (2005), and Rainville and Carr (2001). The first section of the questionnaire included 13 questions related to succession planning based on research by Garman and Tyler (2007). Respondents were asked to indicate with yes or no responses for which positions succession planning was done and which succession planning strategies were used. Reasons for not using succession planning also were requested. The importance of diversity in the succession decision was assessed on a four point scale (mandatory, very important, somewhat important, not important).

A second section collected demographic information about the questionnaire respondent and his/her institution. Data on retirement

*Corresponding Author: Phone: (312) 942-5297; E-mail: Mary_Gregoire@rush.edu

plans of the current foodservice director as well as possible successors were collected.

The final section of the questionnaire contained a list of 20 possible credentials and qualifications that might be required of future hospital foodservice directors based on work by Gregoire et al (2005) and Rainville and Carr (2001). Respondents were asked to indicate the likelihood of each credential or qualification being expected of the next foodservice director in that hospital, using one of three options to indicate whether each credential would be required, preferred or not listed on the job description for the next foodservice director.

The instrument was pilot tested by a group of five hospital executives and five hospital foodservice directors to assess content validity, completeness, understandability, and reliability. Minor revisions were made based on input from the reviewers.

Data Collection

A mailed questionnaire was used for data collection. Recommendations by Dillman (2000) for mailed questionnaires were followed. Each hospital foodservice director received a mailing with an individually signed cover letter detailing the purpose of the study and a request for his/her participation. The mailing included a questionnaire for the director to complete and a postage-paid return envelope. The mailing also included a packet to be given by the foodservice director to the hospital executive to whom the director reports. The executive's packet contained a cover letter, questionnaire and postage-paid return envelope. Questionnaires were coded by hospital to facilitate follow up.

Two weeks after the initial mailing a follow-up mailing was sent with copies of the research questionnaires. Directors were encouraged to respond. If a hospital foodservice director had completed a questionnaire but the executive from that hospital had not responded, a copy of the executive survey was sent to the director with encouragement to give the copy of the questionnaire to the hospital executive, and ask that person to respond.

Data Analysis

The Statistical Package for Social Sciences (SPSS, Chicago, IL, version 15.0) was used for all data analyses. Descriptive statistics were computed for all variables. Chi-square tests were used to compare succession planning and credential expectations of foodservice directors based on demographic characteristics.

RESULTS AND DISCUSSION

Questionnaires were sent to 700 foodservice directors and their immediate hospital executive. A total of 171 returned questionnaires (12% response) were usable for data analysis; 122 directors (17 % response) and 49 hospital executives (7 % response). Hospital size varied with 38% of respondents from hospitals of less than 300 beds, 49 % from hospitals of 300 to 500 beds and 13 % from hospitals greater than 500 beds. Most of the directors (75%) reported working in a self-operated foodservice department. Because of the limited response from hospital executives, only foodservice director data are reported. Reasons for the limited response are not known. Directors and hospital executives may have found the topic not of interest and thus were not willing to devote time to respond. Directors may have chosen not to give a copy of the questionnaire to their hospital executive.

Respondent Characteristics

Foodservice directors who responded to the questionnaire tended to be under the age of 55 (n=80, 70%); 64 (53%) held a master's degree. Approximately half (n=62, 51%) were credentialed as registered dietitians (RDs); 31 (26%) were dietetic technicians, registered (DTR). When asked plans for retirement, 19% indicated they planned to retire in less than five years and 40% planned to retire in 6-10 years.

Prevalence and Characteristics of Succession Planning

As shown in Table 1, succession planning at executive levels was occurring in approximately half of the responding hospitals: 51% indicated that succession planning was being done for the CEO, 56% for the vice president, and 41% for the foodservice director positions. Chi Square analysis did not show the prevalence of succession planning to be related to facility size (number of licensed beds). These results are within the ranges reported by Garman and Tyler (2007), who indicated that succession planning was related to type of facility with 21% of free standing hospitals and 64% of private sector hospitals using this practice for managerial positions. Chi square analysis indicated that use of succession planning for the foodservice director position did not differ significantly based on when the current foodservice director expected to retire.

When succession planning was used, the most frequently employed tactics to prepare candidates were mentoring (90%), leadership activities (79%) and development or stretch activities (61%). Those administrators involved in the foodservice director succession planning were most often the vice president (78%) and the current foodservice director (68%) with the CEO less frequently involved (28%). The vice president selected the new foodservice director in 61% of the hospitals. The most frequently cited technique for the selection of the foodservice director was formal structured interviews (61%) and the majority (94%) considered both internal and external candidates. Diversity appears to be somewhat (40.8%) to very (34.7%) important to the succession selection decision.

Many of the current directors (40%) indicated that a successor or pool of candidates had been identified. If no successor had been identified, reasons most commonly given were: not a high priority, new in director position, no internal candidate, or not a part of organization culture.

Future Credentials for Foodservice Director

Table 2 details the credentials that directors expected for the future foodservice director at their facilities. Degree requirements will continue to be important with 89.6% requiring a bachelor's degree and 53.9% indicating a master's degree will be preferred. The degree preference is consistent with the American Dietetic Associations 2006 Environmental Scan which predicted a demand for advanced degrees to improve professionals' decision making skills. Work experience will be an important credential; 69.6% indicated past foodservice experience will be required and 64.4% indicated past experience as a director will be required. The RD credential seems less valued as a credential for future hospital foodservice directors. Only 41.0% of current directors indicated that their hospitals will require the RD credential in order to direct the foodservice department in the future. Interestingly, foodservice directors who held the RD credential were significantly ($p<.001$) more likely to indicate that it would be a required credential for the future director as compared to responses by non RD directors (69% vs. 15%). This differed from the responses by directors holding the Dietetic Technician, Registered credential. Those with the DTR credential were significantly more likely ($P.<001$) to indicate the RD credential would not be listed (48%).

Respondents also identified a variety of demonstrated skill sets that will be required of the hospital foodservice director of the future: verbal/written communication (86.9%), team leader (86.1%), foodservice operations management (86.1%), customer satisfaction (78.7%), financial management (77.0%), change management (71.3%),

Table 1: Succession Planning in Hospitals[a]		
Characteristic	**n**	**%**
Succession Planning Done for		
CEO	57	51.8
Vice President	60	55.6
Foodservice Director	50	40.7
Succession Planning Activities for Foodservice Director		
Mentoring	43	86.0
Leadership activities	42	84.0
Development (stretch activities)	33	66.0
360-degree feedback	22	44.0
Structured socialization with key stakeholders	20	40.0
Job rotation	8	16.0
Coaching from external consultant	3	6.0
Administrators Involved in FS Director Succession Planning		
Vice President	39	78.0
Foodservice Director	34	68.0
CEO	14	28.0
Director of Nursing	11	23.0
Search Committee	7	14.0
Administrator Making Final Selection of FS Director Successor		
Vice President	30	61.2
CEO	8	16.3
Director of Nursing	1	2.0
Other	10	20.5
How FS Director Succession Planning Decision Made		
Formal, structured interviews	29	61.7
Informal, internal discussion	12	25.5
Planned succession of asst/assoc director	6	12.8
Candidates for FS Director Successor		
Internal only	2	4.2
External only	1	2.1
Both internal and external	45	93.7
Importance of Diversity in Decision		
Mandatory	5	10.3
Very Important	17	34.7
Somewhat Important	20	40.8
Not Important	7	14.3
Communication About Succession Openly Discussed	37	71.2

[a]based on data from hospital foodservice directors, n=122

and human resource management (65.6%). These results are consistent with a previous study by Gregoire et al (2005) in which hospital executives and foodservice directors indicated that team leader, communication, financial management, change management, operations management, and coaching were very important skills for foodservice directors.

CONCLUSIONS

Although generalization of results of this study is limited by the low response rate, data gathered provide important information for current hospital foodservice directors, those aspiring to become hospital foodservice directors, and the dietetics profession. The aging of the baby boomers, results of this study, and information in the trade literature (Schechter, 2007; Schuster, 2005) suggest that many hospital foodservice directors will be retiring within the next 5 to 10 years. Of concern to hospital executives should be, finding the best qualified replacement for these retiring directors.

Succession planning, a strategy of identifying and grooming individuals for future roles, is being used for some hospital foodservice director positions but is somewhat more commonly used for other hospital executive positions. Incorporating the practice of preparing potential successors for the director position through techniques such as mentoring and use of leadership and developmental activities might help prevent disruption in department management when the change in director position occurs.

Those aspiring to the position of hospital foodservice director will find results of this study helpful in their professional development planning. Those desiring a position as hospital foodservice director should develop the credentials indicated as required and/or preferred for those in that position by respondents to this study.

The RD credential may not be required for the position of hospital foodservice director in the future. Although current foodservice directors who hold the RD credential believe the RD credential will be required for future directors, nearly all of the directors who are not RDs do not believe it will be required. Because less than half of current directors appear to hold the RD credential, the likelihood of this credential being required in the future could decrease.

Of some concern to hospitals should be the question of who will direct hospital foodservice departments in the future. Fewer RDs are seeking positions as hospital foodservice directors (Gregoire, et al., 2005; Silverman, et al., 2000) and hospitality management students do not appear to have interest in pursuing hospital foodservice management (Schechter, 2005). Hospital executives are encouraged to consider succession planning to help identity and prepare the next foodservice director for their organization as the demand for hospital foodservice directors might exceed the supply of qualified individuals for the position. Foodservice management educators are encouraged to include hospital foodservice opportunities in their career advisement of students.

Foodservice directors, who hold the RD credential and believe it should be required for future directors, are encouraged to begin mentoring and coaching early career RDs on the benefits and opportunities available as foodservice directors. If RDs are to continue to be the managers of choice for hospital foodservice departments, current RD foodservice directors and leaders in the American Dietetic Association may need to proactively recruit and develop RDs for these positions.

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Table 2: Future Credentials Expected for Hospital Foodservice Directors[a]

	Required		Preferred		Not Listed	
	n	%	n	%	n	%
Education						
Bachelors degree	104	89.6	6	5.2	6	5.2
Master's degree	21	18.3	62	53.9	32	27.8
Doctorate degree	2	1.9	1	1.0	100	97.1
Work Experience						
Foodservice director	76	64.4	38	32.2	4	3.4
Foodservice	78	69.6	15	13.4	19	17.0
Administrative	55	49.1	40	35.7	17	15.2
Credentials						
Registered Dietitian	48	41.0	39	33.3	30	25.7
Certified Dietary Manager	8	7.8	22	21.6	72	70.6
Dietary Technician, Registered	2	2.0	5	5.1	92	92.9
Demonstrated Skills						
Verbal/written communication	106	86.9	12	9.8	4	3.3
Team leader	105	86.1	14	11.5	3	2.4
Foodservice operations mgmt	105	86.1	13	10.6	4	3.3
Customer satisfaction	96	78.7	22	18.0	4	3.3
Financial management	94	77.0	25	20.4	2	1.6
Change management	87	72.5	28	23.3	5	4.2
Human resource management	80	65.6	33	27.0	9	7.4
Multiple unit management	33	27.5	52	43.3	35	29.2
Clinical Nutr Services Mgmt	27	22.7	65	54.6	27	22.7
Marketing	22	18.6	61	51.7	35	29.7
Culinary	18	15.1	74	62.2	27	22.7

[a]based on data from hospital foodservice directors, n=122

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Research Contribution

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WHAT SUSTAINABLE PRACTICES EXIST IN COLLEGE AND UNIVERSITY DINING SERVICES?

Chao-Jung (Rita) Chen, PhD[1*]; Susan Arendt, PhD, RD[2]; Mary Gregoire, PhD, RD[3]

[1]Independent Consultant, Knoxville, TN 37922, USA
[2]Assistant Professor, Apparel, Educational Studies & Hospitality Management, Iowa State University, Ames, Iowa 50011, USA
[3]Professor and Director of Food & Nutrition Services, Rush University Medical Center, Chicago, IL 60612, USA

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, Enshanyan, & 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.

*Corresponding Author: Phone: (979) 739-64180; E-mail: ritachen63@gmail.com

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.

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).

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

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)

	Influencers[a]								
	Students	Customers	Administrator	Personnel	Faculty/ staff	Suppliers/ venders	State/local government	Management company	Extension agent
Variables	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Region									
Midwest	6.15	5.74	5.52	4.74	4.74	3.30	3.37	2.76	2.60
	(1.07)	(1.25)	(1.17)	(1.58)	(1.41)	(1.70)	(1.99)	(2.39)	(1.67)
Northeast	6.06	5.78	5.54	4.85	4.78	3.73	3.06	2.75	2.33
	(1.01)	(1.09)	(1.50)	(1.74)	(1.39)	(1.65)	(1.84)	(2.07)	(1.47)
South	5.46	4.97	5.43	4.95	4.36	3.19	3.01	3.83	2.53
	(1.36)	(1.40)	(1.19)	(1.52)	(1.26)	(1.54)	(1.43)	(2.45)	(1.55)
West	6.27	5.63	5.03	5.00	4.67	3.63	3.64	2.56	2.87
	(1.14)	(1.13)	(1.63)	(1.53)	(1.39)	(1.52)	(2.06)	(2.22)	(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	5.50	5.19	4.89	4.54	3.26	3.10	1.53	2.49
	(1.22)	(1.34)	(1.53)	(1.60)	(1.40)	(1.63)	(1.90)	(1.20)	(1.53)
Contract	6.14	5.73	5.76	4.92	4.93	3.87	3.67	5.37	2.76
Managed	(1.08)	(1.11)	(1.01)	(1.63)	(1.38)	(1.55)	(1.75)	(1.68)	(1.75)
t-value	-0.85	-.99	-2.59*	-0.09	-1.57	-2.13*	-1.72	-14.03**	-0.92
Overall mean	6.04	5.60	5.40	4.89	4.67	3.48	3.31	2.89	2.58
(SD)	(1.17)	(1.26)	(1.39)	(1.61)	(1.40)	(1.64)	(1.94)	(2.36)	(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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Research Contribution

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LEADERSHIP BEHAVIORS OF SCHOOL FOODSERVICE DIRECTORS AT FINANCIALLY SUCCESSFUL OPERATIONS: A QUALITATIVE STUDY

Susan W. Arendt, PhD, RD

Assistant Professor, Department of Apparel, Educational Studies, and Hospitality Management, Iowa State University, Ames, IA, 50011, USA

ABSTRACT

Although the majority of leadership research has focused on self-reported leadership behaviors, this qualitative research study assessed observable leadership behaviors of school foodservice directors. Participant observation of seven directors occurred individually over a total of 55 hours. Data triangulation and analysis revealed six key leadership dimensions: serving, mentoring, humanizing, innovating, leveraging, and challenging. These leadership dimensions are described and suggestions are given on how they might be used for educational purposes and human resources management of foodservice directors.

Keywords: leadership, school, foodservice, directors

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INTRODUCTION

School foodservice directors face multiple challenges in their jobs. Participation rates, wellness policy, and recess placement are just a few of these challenges (Rainville, Wolf, & Carr, 2006). Leadership, defined as exhibiting leadership behaviors, is necessary for success in addressing these and many other job challenges.

The leadership literature is immense; common leadership theories abound such as older theories and models emphasizing traits or styles of leaders to more recent theories and models like servant leadership (Greenleaf, 1977), transformational leadership (Bass, 1985), and leadership practices (Kouzes & Posner, 2002) as well as the importance of the leadership-learning connection (Brown & Posner, 2001; Marques, 2007). When reviewing such theories, it is important to note the leadership evolution and current leadership "think" with emphasis on relationships, interactions, and behaviors towards others. The benefits of leaders who exhibit leadership behaviors have been touted: decreased employee turnover, increased employee satisfaction, and increased organization financial success (Lim, 2008; Ozcelik, Langton, & Aldrich, 2008; Waldman, Ramirez, House & Puraman, 2001).

Minimal works have been published about dietetics and foodservice leadership (Gregoire & Arendt, 2004). When reported, published works have found the leadership measurement instruments to be less reliable in dietetics and foodservice sample populations as compared to other populations studied (Arendt & Gregoire, 2005a; Burzminski, 2002). Dietetics and hospitality management students' leadership perceptions, self-reported leadership behaviors, and learning strategies have been studied (Arendt & Gregoire, 2005a, 2005b, 2006). The ability to exhibit leadership behaviors both as a student and later as a professional is important.

Competencies, knowledge, and skills for success as a school nutrition manager have been established, and "providing leadership" is a commonality to the functional areas of service, sanitation, safety and security, nutrition and menu planning, procurement, marketing, human resources management, and professional management (Cater & Carr, 2007). Gregoire, Sames, Dowling, and Lafferty (2005) researched leadership needs for foodservice directors. Thirty-nine competency statements were developed for hospital foodservice directors. Both hospital executives and directors rated two competency statements (acts as an effective team leader and demonstrates leadership) in the top three of the potential foodservice director competencies identified (Gregoire, Sames, Dowling, & Lafferty, 2005). Likewise, in their study rating competencies and skills of assisted-living food service directors and their administrators, Lee, Remig, and Shanklin (2008) found that "act as an effective team leader" was rated the most important by both directors and administrators. In another study of 149 school nutrition professionals, Dycus (2007) found self-reported leadership practice scores, as measured using the Leadership Practice Inventory questionnaire, to be higher in this group as compared to score norms. Although the importance of leadership is recognized, little work has been done to identify how foodservice directors exhibit leadership behaviors.

Therefore, this research project was a first step in theory-development work related to leadership behaviors of school foodservice directors. The purpose of this research was to provide insights about observed behaviors of school foodservice leaders. Additionally, findings may aid educators by providing information on leadership behaviors needed for school foodservice director jobs so that opportunities might be incorporated into the classroom allowing students to practice leadership. This research identified key behaviors for foodservice school leadership that can be used in selecting the best candidate for these positions and in preparing succession plans for expected voluntary separations such as retirements.

METHODS

Qualitative methodology was utilized; qualitative research allows the researcher to explore the "how" question because it is emergent in nature and involves theory developing (Taylor & Bogdan, 1998). Theory (or concept) sampling was employed; this is a type of purposeful sampling technique "in which the researcher samples individuals or sites because they can help the researcher generate or discover a theory or specific concepts within the theory" (Creswell, 2008, pg. 216).

A contact list of 13 potential on-site foodservice directors, who met the sampling criteria, within a 300 mile radius of the researcher's institution was developed. All contacts were viewed to be "leaders" by their colleagues and served as a foodservice director of a financially-stable school nutrition program. All potential participants were contacted by telephone and commitment was received from seven of the 13. Those declining were either not available at the time of the contact or not available during the observational period. Protocol consistent with that submitted and approved by the University Institutional Review Board was followed.

*Corresponding Author: Phone: (515) 294-7575; E-mail: sarendt@iastate.edu

Participant observations occurred at seven different sites with seven different informants (directors). Achterberg and Arendt (2008) wrote this about participant observation, "The researcher becomes part of the study and is able to learn more through firsthand experiences by participating themselves" (pg. 69). Two examples of participation during the observational period included: serving students lunch along-side the director as she "filled in" for an absent employee and participating in a meeting of foodservice managers led by the director.

Six of the site visits spanned the director's entire work day (starting between 6am and 8am then ending between 4pm and 5pm), however one visit was cut short due to the threat of bad weather resulting in a five-hour observation period (as compared to eight or more hours for all others). As noted by Angrosino (2005), "naturalistic observation should not interfere with the people or activities under observation" (pg 730). Therefore, care was taken to blend into the normal flow of the operation by observing from locations away from heavy traffic flow and participating in normal operations, as appropriate. All interviews were conducted during the observation period with the exception of the shorter visit; this interview was conducted via phone.

Particularly in qualitative research, the credibility of the researcher is of concern because the researcher is the instrument. I have extensive knowledge, training, and experience in qualitative research methods including (but not limited to) qualitative research coursework and experience in qualitative data collection such as individual and group interviews.

Field notes, tape-recordings, leadership observation tracking forms, and in-depth interview guides were the primary data collection tools. Artifacts (i.e. meeting agendas, inservice handouts, memos, and standard documentation forms) also were collected for analysis. Upon completion of each site visit, field notes, artifacts, and observational tracking forms were analyzed for themes by another trained researcher and me. Tapes, containing the in-depth interview, were transcribed by an experienced, paid transcriptionist and data were analyzed. Verification of data interpretation was confirmed using triangulation, a method used for cross-checking data sources. Trustworthiness of data was strengthened using member checking as described by Achterberg and Arendt (2008).

RESULTS

All participants were female and ranged in age from 45 to 65 years old. Larger sized districts and smaller school districts were represented (900 – 7000+ meals/day served). During the interview process, all directors confirmed their operation's positive financial status. Total observational time period for all seven visits was 55 hours.

Based on coding and themeing, six predominate areas emerged and were found consistent among all leaders: serving, mentoring, humanizing, innovating, leveraging, and challenging. A model of the leadership dimensions can be found in Figure 1. Likewise, Table 1 illustrates examples of behaviors in each leadership dimension.

Serving

Not only did all directors serve their employees, but they also anticipate needs of their employees. Providing resources such as time, additional employee help, or additional training was viewed as the serving dimension. Exemplary quotations from foodservice directors as they practiced serving follow:

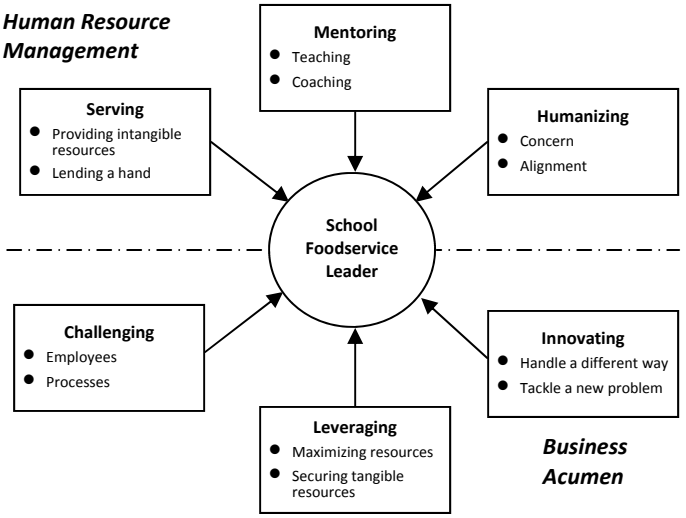

Figure 1: Dimensions of Leadership Model

- " Hello, I am fine. What can I do for you?" – participant on the phone with an employee.
- "Now what can I do for you?"
- "Anything else I can do for you?"

Mentoring

All leaders were observed mentoring others. Several worked with students interested in foodservice or dietetics, others mentored co-workers and/or employees. Teaching and coaching also were viewed as mentoring. Two directors addressed their mentorship of disabled or otherwise challenged employees. Referring to one employee the directors stated, "We're doing something good here. He's a good kid."

Humanizing

This term is an all encompassing term used to cover the behavior exhibited by these leaders referring to "I am one of you, I am human too. I care about you. I can empathize with you." Concern for others also was placed in this category. It was common to hear words aligning the director with the employee, i.e.,"I'm glad your household is like that too" (director stating that the employee's household was similar to the director's with regards to a particular home situation.)

Recognizing that all of these directors were women, the literature related to women's leadership parallels some of the noted themed areas. For instance, it has been noted that women leaders, as compared to men leaders, are more concerned about "taking care of others, more concerned about making sure others are comfortable" (McMahon, 2005, p. 302). This parallels the notion of the "humanizing" dimension in the current foodservice director leadership model.

Innovating

Innovating referred to new and different ways to handle the situation in which the leader had been placed. Several examples dealt with the location of foods in the cafeteria line, healthy vending machine options, and different ways to handle human resource management issues such as recruiting and scheduling. One participant gave this innovating quotation, "The first day of school is only a half day. It's a nightmare to get all kids through (the lunch line). They are just learning their id number and learning the process. So, I proposed we just feed for free and take reimbursement."

Table 1: Leadership Dimensions with Selected Situations and Example Behaviors		
Dimension	**Situation**	**Exhibiting Leadership Behaviors**
Challenging	• A change has been made to lunch schedule and change was not communicated to foodservice • Recess occurs after lunch but director prefers it before • Manual processing of free/reduced applications	• Leader addresses involved parties and explains reason why having the change communicated is so important (portion sizes are different for different ages of students) • Continues to voice concern and push for change to align with best practices of recess before lunch • Consideration of an automated system
Leveraging	• Limited resources available for marketing • Wanting to get an after school program started to help promote wellness concepts	• Partnered with vendors and local organizations to get funding • Writing of grant to get funded. Have already obtained one grant to support wellness efforts
Innovating	• Fresh fruit not being selected by students • Casino is coming to town • Always needing subs but never enough	• Reallocation of space to allow fruit a more visible location and encourage students to take it • Noted impact and need for different way of hiring • Created a full time sub position with title of utility worker
Serving	• Employee struggling with inventory issues	• Director responds by asking what else the employee needs in her inventory to make it easier for her
Mentoring	• Manager not understanding offer vs. serve concept • Manager completing employee performance evaluations differently than established evaluation criteria	• Director patiently explains to the employee during manager's meeting and then continues to follow-up. • Director coaches manager on a specific employee evaluation
Humanizing	• Threat of snowstorm • Employees with challenging past • Walking program at the school	• Meeting canceled due to impending snow storm as informant notes "we don't want anyone to be injured" • Investing in employees by providing opportunities • Director joins in, and foodservice department has highest miles of any other department

Leveraging

This dimension was labeled as leveraging based on observations where participants used the resources available to make the operation even better. Leveraging was done by all participants but exhibited in multiple ways. In one case, the director utilized student labor to open an a la carte venue when labor resources were otherwise not available. Human resource constraints had previously prohibited opening of the venue.

Challenging

This referenced challenging the organizations status quo and also challenging employees regarding work attitude and duties. These directors did not seem to subscript to the adage, "If it's not broke, don't fix it" but rather looked to challenge the process in order to make the overall foodservice operation better. Illustrative comments and situations of challenging follow.

There was an accounting problem as the person in charge of accounting had recently changed the process. The participant relayed this: "I knew there was something wrong with it.. So, I went in and said… (You) can't be afraid to confront when issues need to be resolved". Another participant had this to say as she met with a supervisor who was consistently rating employees lower on performance appraisals, "Is there any reason you won't rate her above average?"

Serving, mentoring, humanizing, innovating, leveraging and challenging best encompassed the behaviors of all foodservice directors observed. The dimensions of serving, mentoring, and humanizing appear to be focused toward the human resources management (people) side of the job. Innovating, leveraging, and challenging appear to be focused toward the business acumen of the job such as financial resource management.

CONCLUSIONS AND APPLICATIONS

This study serves as an exploration of exhibited leadership behaviors by seven foodservice directors. Although most leadership work in the area has used self-reported questionnaires, this study is unique in that actual observations of school foodservice directors were made. Common to all directors observed were six dimensions of leadership: 1) serving 2) mentoring 3) humanizing 4) challenging 5) leveraging and 6) innovating. A blending of human resources aspects and business acumen appear to be key behaviors of on-site school foodservice directors. Further research is needed to test this leadership dimensions model.

Certain limitations are recognized with this work and with qualitative work in general. Qualitative work is not to be generalized but rather to cover breadth and depth of a topic area. This study, therefore, serves as the catalyst for additional quantitative work. Furthermore, it is recognized that participants' behaviors may have been altered by the researcher making observations. To minimize the potential of this happening, the researcher observed for an extended period of time and collected various documents (such as meeting agendas, memos, and reports) to supplement observations. Bias also can become a limitation in qualitative work. This researcher has had training and experience in qualitative research methods and had not met any of the participants prior to observation.

Individuals exhibiting leadership behaviors have been shown to have a positive impact in the workplace: decreased employee turnover, better employee performance, greater employee job satisfaction, improved organizational success (Bono & Judge, 2003; Calloway & Awadzi, 2008; Lim, 2008). Specific knowledge and skills are required to become a successful foodservice leader. The visible signs of leadership are behaviors, exhibited by individuals, often based on their acquired knowledge and skills. Foodservice management students acquire knowledge and skills in the classroom and other

context areas, such as home and work. Although these knowledge and skills are important, overall leadership behaviors, or the visible sign of leadership, are most important. Opportunities both inside and outside the classroom may help students develop leadership behaviors. For example, mentoring opportunities could be developed by having senior students work with lower classmen. Senior students could provide mentorship on class projects or assignments as well as work or job context related activities.

Instructors need to know how to design coursework appropriately. There is evidence that group work projects allow students to further develop leadership behaviors (Arendt & Gregoire, 2006). All six dimensions of leadership described above could be incorporated into such a project. Through innovation of ideas, leveraging of resources, serving others in the group, mentoring group members, practicing compassion (humanizing), and being encouraged to challenge the status quo, students can practice leadership behaviors and prepare to assume leadership roles in foodservice professions. As noted by Posner (2009), "Teaching about leadership is necessary to enable others to lead effectively, but it is not sufficient…in the sense that leadership requires doing and leadership development therefore requires action-learning…" (pg. 1).

Additionally, these dimensions could be incorporated as criteria for the selection and hiring process as well as professional development and succession planning for school foodservice director positions. Applicants for such positions could be screened for the behaviors of challenging, mentoring, humanizing, serving, leveraging, and innovating. The use of probing, behavioral questions on an application or in an interview would be one way to screen for these six dimensions. Example questions might include: "Tell me about a time when you mentored someone?" or "Tell me about a time when you came up with a new idea or new way of accomplishing a task?".

Gregoire and Greathouse (2008) found that mentoring was one of the most common assignments used in succession planning of school foodservice directors, but only 20% of the study schools responding to the questionnaire participated in succession planning. Given the majority of organizational leaders are Baby Boomers (Chartrand & Hagemann, 2009) and expected to retire over the next 15 years, succession planning is of paramount importance in all organizations. Seeking out individuals with the six leadership behaviors identified here, will help secure the continued success of school foodservices.

The observation and identification of these six dimensions of leadership in successful school foodservice directors is important for use in education of future directors. Likewise, these dimensions are useful for job placement and succession planning.

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Research Contribution

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AN INVESTIGATION OF COLLEGE AND UNIVERSITY FOODSERVICE ADMINISTRATORS' PERCEPTIONS OF FOOD WASTE REDUCTION ACTIVITIES AND FOOD WASTE DISPOSAL METHODS

Sockju Kwon, PhD, RD, LD[1*]; Carolyn M. Bednar, PhD, RD, LD, CFCS[2];
Junehee Kwon, PhD, RD[3]; Rose M. Bush, MS, MBA, RD[4]

[1]Visiting Assistant Professor, Department of Biomedical Sciences, Missouri State University, Springfield, MO, 65897, USA
[2]Professor, Department of Nutrition & Food Sciences, Texas Woman's University, Denton, TX, 76204, USA
[3]Associate Professor, Department Hospitality Management & Dietetics, Kansas State University, Manhattan, KS 66506, USA
[4]Associate Clinical Professor/Dietetic Internship Director, Department of Nutrition & Food Sciences, Texas Woman's University, Houston, TX, 77030, USA

ABSTRACT

This study was designed to investigate foodservice administrators' perceptions regarding food waste management (FWM) in college and university foodservice operations. Research methods included focus groups and a national survey. The survey questionnaire was developed based on focus groups and validated and pilot-tested before posting online. Sixty-three voting delegates of the National Association of College and University Food Services completed the survey. Educating customers about FWM and composting were selected as most likely to reduce food waste among food waste reduction activities and among food disposal methods, respectively. Results varied depending on management types, operation types, and information source about FWM.

Keywords: food waste management, college and university foodservice operations, composting, food waste disposal

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INTRODUCTION

Sustainability has become an important concept in today's society, and trends toward sustainability in colleges and universities are apparent. Several colleges have been recognized for practicing resource conservation and effective waste management by the Association for the Advancement of Sustainability in Higher Education (Association for the Advancement of Sustainability in Higher Education [AASHE], 2009). RecycleMania, a national waste management competition among colleges and universities, is an example of a project that recycles municipal solid waste (MSW) generated from residence and dining halls on campuses (National Recycling Coalition, 2009). Trayless dining, a recent innovative concept in college and university foodservice operations, showed an effective reduction of 25 to 30% in food waste as well as savings in water and energy (Aramark Higher Education, 2008; Meltzer & Stumpf, 2008). Sarjahani, Serrano and Johnson (2009) recently reported that going trayless in an all-you-can-eat university dining facility serving 2,862 meals per day generated 5,829 pounds less of food waste and 1,111 pounds less of package waste in one week.

Since 1960, the total amount of MSW in the U.S. has increased dramatically. However, in 2008, less MSW was generated than in 2007. In 2008, about one third of MSW was, but only 2.5% of food waste was recycled (Environmental Protection Agency [EPA], 2009a). Unlike recycling programs for non-food items, food waste management has not been extensively implemented in foodservice operations. A previous report by the Center for Ecological Technology and Massachusetts Department of Environmental Protection stated several barriers such as limited access to the processing site, training issues, the nature of food waste, inconsistent governmental and financial support, and no proactive governmental requirements (Center for Ecological Technology, 1999).

Land-filled food waste can produce methane gas that results in 21 times greater impact on global warming than carbon dioxide (EPA, 2009b). Unfortunately, most food scraps from homes and small foodservice operations are discarded in garbage bags and sent to landfills. A large quantity of food waste is generated from college and university foodservice operations, and such operations can offer the opportunity for other recommended methods of food recycling such as composting, donation of food to local food banks, or sale of food waste to farmers for animal feedings.

Due to the direct relationship between food waste and reduced profit in foodservice operations, most foodservice administrators are aware of the importance of food waste management in minimizing food expenditures (Gregoire, 2010). They may also be aware of its impact on enhancing environmental sustainability and the public image of operations. The literature includes several success stories about managing food waste from foodservice operations such as sending food waste to composting sites and recycling frying oil for biodiesel fuel (Buchthal, 2006; Miller, 2007).

The possibility of effective food waste management in college and university foodservice operations has been demonstrated. However, only a few college and university foodservice operations have actively participated in food waste management programs. Therefore, this study was designed to investigate college and university foodservice administrators' perceptions of management activities to reduce food waste and food waste disposal methods.

METHODS

Study Approval from Institutional Review Board

All methods used in this study were reviewed and approved by the Institutional Review Board at a University prior to commencing research activities.

Focus Group

Focus group methods (Edmunds, 1999) were used to obtain qualitative background information on the issue of food waste management in college and university foodservice operations. Foodservice administrators' contact information was collected from public web sites of colleges and universities in the Dallas, Fort Worth, and Houston areas. Foodservice administrators were recruited by e-

*Corresponding Author: Phone: (785) 317-9669; E-mail: skwon@missouirstate.edu

mails and phone calls with priority placed on recruiting directors who had participated in the RecycleMania program. During the 45-60 minute focus group sessions, foodservice administrators were asked questions about practices and attitudes on food waste management. Participants were rewarded with a gift certificate for a national retailer following focus group discussions. Two focus group discussion sessions with a total of seven participants were conducted, recorded, transcribed verbatim, and analyzed to determine key messages.

Survey

Based on focus group results and a review of literature (Harmon & Gerald, 2007), the researchers developed a questionnaire that focused on (a) demographic information about foodservice administrators, (b) characteristics of foodservice operations, (c) operational factors affecting food waste such as use of disposables, forecasting, type of food production and service, menu and portion control, and (d) use of various food waste reduction activities to manage food waste. According to focus group results, questions were reduced to eight food waste management activities and seven food disposal methods. Some activities and methods were more strongly supported by some focus group participants than others, but due to the qualitative nature of the data, no attempt was made to draw further conclusions from the results. A likert-type 5-point scale ranging from 1 (very unlikely) to 5 (very likely) was used to measure administrator perceptions on the effectiveness of various foodservice activities to reduce food waste and waste disposal methods. In order to determine differences in possible key factors impacting decision making on food waste programs, the following independent variables were examined: type of management, existence of a residential dining area, number of meals served, type of meal plan, type of food production, and source of information about food waste management. The questionnaire was validated by three foodservice educators and two university foodservice administrators for content validity and readability. It was revised according to their suggestions and converted to an online survey form using PsychData (PsychData™ LLC, 2008, State College, PA).

A pilot-study was conducted with a convenience sample of 33 voting delegates of NACUFS in Texas and Oklahoma. Six administrators completed the online survey and verified the clarity and feasibility of the questions. Cronbach's alpha test was applied to evaluate the reliability of likert-type scale questions and those with alpha value higher than 0.8 were accepted. Cronbach's alpha test showed that sets of questions for foodservice activities to reduce the amount of food waste (Cronbach's a=0.928) and questions regarding effectiveness of food waste disposal methods (Cronbach's a=0.860) were reliable.

Data Collection

A mailing list of 624 voting delegates of the National Association of College and University Food Services (NACUFS) was purchased as the study sample. A cover letter that included a web page link to the survey was e-mailed to 591 (i.e., 624 minus 33 from TX and OK) voting delegates of NACUFS who had provided e-mail addresses. Two weeks later follow-up e-mails were sent. At the same time, a cover letter and printed questionnaire were also sent to voting delegates of NACUFS who had not yet responded. Three weeks after the postal mailing, a follow-up reminder post card was sent to non-respondents to increase the participation rate.

Data Analysis

The Statistical Package for the Social Sciences for Windows (SPSS, v 15.0, 2008, Chicago, IL) was used for data analyses. Descriptive statistics were calculated to summarize data related to demographics, foodservice operation characteristics, food waste reduction activities, and waste disposal methods. The number of meals served per week was divided into four groups (≤5,999, n=14; 6000-14,999, n=16; 15,000-39,999, n=17; and ≥ 40,000, n=15) to determine the effect of number of meals served per week on college and university foodservice administrators' perceptions toward food waste reduction activities and food waste disposal methods. To evaluate the correlations between cost and frequency for collecting food and package waste, Spearman Rho correlation coefficients were calculated. Repeated measures multivariate analysis of variance (MANOVA) was conducted to test for differences in variables within each category including food waste reduction activities and food waste disposal methods as well as between group differences on those items.

RESULTS AND DISCUSSION

Characteristics of Survey Respondents

Online and/or mailing forms of questionnaires were sent to a total of 591 voting delegates of NACUFS. A total of 93 surveys were submitted (15.7%), but only 63 of them were complete (10.6%). Thirty-six surveys were collected online and 27 from mailed surveys. The majority of survey respondents were male (n=46) and between ages 40 to 59 (n=49) (Table 1). Their mean work experience was 13.8 years in college and university foodservice operations. Approximately half of the respondents had a bachelor's degree or higher. Respondents indicated that they obtained information about food waste management mostly from college and university web pages (n=41), professional journals (n=39), and trade journals (n=37); only a few used government web pages (n=8) as a source of information.

Table 1. Demographic Characteristics of College & University Foodservice Administrators (N=63)

Gender	**n**	**%**
Male	46	73.0
Female	17	27.0
Age	**n**	**%**
20-29	2	3.2
30-39	7	11.1
40-49	24	38.1
50-59	25	39.7
≥ 60	5	7.9
Education	**n**	**%**
Associate degree	7	11.1
Bachelor's degree	32	50.8
Master's degree	17	27.0
Doctoral degree	1	1.6
Other	6	9.5
Years of experience	**Mean**	**± SD**
College and university foodservice	13.8	± 10.3
All foodservices	26.6	± 9.80
Source of information about food waste management[a]	**n**	**%**
College and university web pages	41	26.5
Professional journals	39	25.2
Trade journals	37	23.9
Waste management company	24	15.5
Governmental web pages	8	5.2
I do not obtain any information about food waste management	6	3.9

SD=Standard Deviation

[a]The total number of responses exceeds total N because respondents were asked to check all that apply.

Characteristics of Foodservice Operations

Foodservice operations where respondents were employed varied in size from 14 serving fewer than 5,999 meals per week to three that served more than 100,000 meals per week (Table 2). If those three are excluded, the average for other respondents was 22,870 meals per week. The average number of catering events per week was 48.5 which represented an average of 1,345 catered meals weekly. The 47 foodservice administrators who stated that they had residential dining halls estimated that approximately 70% of total revenue came from this source. Twenty foodservice operations were contract managed, and 41 were self-operated. Two respondents specified "Other" type of management, but did not further describe. Meal plans were approximately evenly distributed between traditional, cash-based, and a combination of traditional and cash based meal plans. Responses for 15 colleges and universities that had other meal plans included a mandatory unlimited meal plan, no meal plan, or all meals included in tuition. Nearly all respondents used cook-to-serve (n=59) and cook-to-order (n=56) production systems while approximately one-fifth of respondents used cook-chill (n=12). One respondent listed in-store fast food restaurant under "other" methods of production.

Table 2. Characteristics of College and University Foodservice Operations (N=63)

	n	%
Number of meals or meal equivalents served/week		
Less than 5,999	14	22.2
6,000-14,999	16	25.4
15,000-39,999	17	27.0
More than 40,000	15	23.8
No answer	1	1.6
Number of catering events/week		
Less than 10	14	22.2
11-25	15	23.8
26-50	19	30.2
More than 51	7	11.1
No answer	8	12.7
Number of facilities serving residential dining halls	47	74.6
Type of management		
Contract managed	20	30.7
Self-managed	41	65.1
Others	2	3.2
Type of foodservice production[a]		
Cook-to-serve (cook and hold food at serving line)	59	35.1
Cook-to-order (order from customers and cook food right at serving line)	56	33.3
Assembly-serve (reheat and serve already prepared Foods)	40	23.8
Cook-chill (cook, cool, refrigerate, reheat and serve Foods)	12	7.1
Other	1	0.6
Type of meal plans[a]		
Traditional meal plan (set number of meals per week or per semester)	26	32.1
Combination of traditional and cash based meal plans	21	25.9
Cash-based meal plan (cash deposit or credit card)	19	23.5
Other	15	18.5

[a]The total number of responses exceeds N because respondents were asked to check all that apply.

Characteristics of Food Waste from Operations

The frequency and cost for collecting food waste was almost the same as frequency and cost for collecting package waste (Table 3). Although 31 respondents did not reported the weight or volume of waste from their operations, the other respondents (n=32) reported that the weight of food waste collected per month was about four times heavier than package waste (19,600 vs. 4,600 lb, respectively). On the other hand, the volume of food waste collected per month was only about one-twentieth of the volume of package waste (620 vs. 12,800 cu ft, respectively). Results of this study were very similar to the characteristics of waste from a continuing care retirement community in a previous study (Hackes, Shanklin, Kim, & Su, 1997) and waste from a university dining facility in Virginia (Sarjahani, Serrano, & Johnson, 2009).

Table 3. Characteristics of Waste Produced in College and University Foodservice Operations (N=63)

	Package Waste	Food Waste
Frequency (times/month)	**n**	**n**
Less than 5	13	16
6-10	11	5
11-20	21	23
More than 21	11	12
No answer	7	7
Cost ($/month)	**n**	**n**
Less than $500	17	13
$501-1000	5	7
$1001-2000	6	6
More than $2001	4	6
No answer	31	31

Based on the limited data regarding food and package waste from 32 operations, the frequency of collecting package waste was not correlated to the cost for package waste collection ($r=0.168$, $P=0.320$). The frequency of collecting food waste was also not correlated to the cost for food waste collection ($r=0.241$, $P=0.151$). The inconsistency of correlation between frequency and cost for each type of waste may be due to employees not separating food waste from package waste produced from foodservice operations.

Food Waste Reduction Activities to Reduce Food Waste

Respondents rated how likely eight food waste reduction activities would be to reduce food waste on a 5-point scale ranging from 1 (very unlikely) to 5 (very likely). There were significant differences among the activities listed in our survey (Degrees of freedom=7, $F=5.05$, $P<0.001$, a repeated measure MANOVA item analysis). The mean scores of all eight food waste reduction activities asked in the questionnaire were greater than 3.50 indicating that in general the respondents considered these activities positively (Table 4). Educating customers was perceived as most likely to reduce food waste from the foodservice operations. Educating customers was perceived to be significantly more likely to reduce food waste than adjusting portion sizes, putting a trash bin to collect food scraps for food waste program, and changing menu planning. This was consistent with the focus group results as well. All focus group participants agreed that consumer education should be the primary foodservice activity to reduce food waste from the operations. College and university foodservice administrators' perceptions of food waste reduction activities were not significantly different for other independent variables used in this study such as type of management and type of production.

Table 4. College and University Foodservice Administrators' Average Perceptions of Likeliness of Food Waste Reduction Activities to Reduce Food Waste (N=63)

Food waste reduction activities	Mean ± SD
Educate customers to reduce food waste	4.51 ± 0.69[a]
Modify food production practices to reduce food waste (ex. change to small batch size, improve use of leftovers)	4.33 ± 0.98[ab]
Use a computer program to have accurate forecasting and managing food production	4.26 ± 1.05[abc]
Train employees to separate food waste and packaging (ex. animal feeds, composting)	4.17 ± 1.08[abc]
Change service methods to reduce food waste (ex. trayless, charge by item style cafeteria)	4.06 ± 1.23[abc]
Adjust portion sizes to reduce food waste	4.00 ± 1.06[bc]
Put a trash bin to collect food scraps for food waste program (ex. animal feeds, composting)	3.72 ± 1.27[c]
Change menu planning to reduce food waste (ex. reduce number of menu items produced, reduce portion size)	3.69 ± 1.42[c]

Likeliness scales: 1, very unlikely; 2, unlikely; 3, unsure; 4, likely; 5, very likely

SD: Standard Deviation

Statistical significance was analyzed by a repeated measures MANOVA (Degrees of Freedom=7, F=5.05, p<0.001).

Values with different superscripts are significantly different (P<0.05) from each other analyzed by pairwise comparisons

Modifying food production practices and using computer programs for accurate forecasting were perceived as the next most likely activities to reduce food waste by college and university foodservice administrators. However, the repeated measures of MANOVA results showed that the mean differences were only significant when these variables were compared to putting a trash bin to collect food scraps for food waste program or changing menu planning. The other food waste management activities did not show the significant differences between mean scores despite the differences in numerical values (Table 4).

The results were somewhat consistent with the responses of foodservice administrators in focus groups who stated that batch cooking and accurate forecasting were helpful in reducing food waste from the operations. Modifying food production practices and using computer programs for accurate forecasting were considered more likely to reduce food waste by college and university foodservice administrators working at operations serving more than 15,000 meals per week compared to those serving less than 5,999 meals per week (One-way ANOVA, F=5.995, P<0.01 for modifying food production practices; F=4.771, P<0.01 for using computer programs for accurate forecasting).

Food waste reduction activities receiving the next highest likeliness ratings were to train employees to separate food waste and packaging, change service methods to reduce food waste (i.e. trayless dining; charge by item style cafeteria), and adjust portion sizes. No significant difference was shown in college and university foodservice administrators' perceptions of using employee training and changing service method to reduce food waste according to any of the independent variables used in this study such as type of production and type of management. Recent research has shown that trayless dining environments result in a significant reduction in food waste from foodservice operations (Aramark Risk Management, 2008; Meltzer & Stumpf, 2008). Participants in focus group discussions rated trayless dining as a very effective method in reducing food waste from the operations. However, in this survey changing service methods (i.e. trayless dining or charging by item) was not perceived as one of the top three food waste reduction activities likely to reduce food waste. Changing service methods was also not significantly different from any of other food waste reduction activities. This may be because trayless service is a relatively new concept to the college and university foodservice administrators who responded to this survey. Adjusting portion sizes was perceived as a foodservice activity significantly likely to reduce food waste by foodservice administrators who offered cash-based inclining/declining balance meal plans compared to those who did not (4.44±0.71 vs. 3.82±1.13, P<0.05).

The two food waste reduction activities that rated lowest in likelihood to reduce food waste were trash bin placement to collect food scraps for food waste programs such as animal feeds and composting and change in menu planning to reduce food waste. No significant difference existed in college and university foodservice administrators' perceptions of menu adjustment to reduce food waste according to any of the independent variables used in this study. Although the previous studies did not address placing a trash bin to collect food waste as a food waste management activity, our focus group participants suggested this method as a way to encourage college students to separate food and package waste for better handling wastes. Trash bin placement was perceived as a significant foodservice activity to reduce food waste only by foodservice administrators who obtained information about a food waste management from a waste contract management company (4.13±1.01 vs. 3.47±1.35, P<0.05). Therefore, further research may need to address the effectiveness of this activity as a viable option for improving food waste management.

Perceptions of the Effectiveness of Food Waste Disposal Methods

College and university foodservice administrators' perceptions of the effectiveness of food waste disposal methods ranged from 3.00 to 4.06 (unsure to likely) (See Table 5), whereas their perceptions of likeliness of food waste reduction activities to reduce food waste ranged from 3.61 to 4.51 (likely to very likely) (See Table 4). Thus it appears that foodservice administrators were more knowledgeable and confident about the effectiveness of food waste reduction activities than specific food waste disposal methods.

Respondents were asked to rate on a 5-point likert type scale the effectiveness of seven food waste disposal methods. A repeated measure MANOVA item analysis showed that there was significant differences in the perceptions of foodservice administrators regarding waste disposal methods (Degree of freedom=6, F=8.07, P<0.001). Among waste disposal methods suggested in our survey, sending food scraps to composting sites was thought most likely to be effective for food waste disposal. Composting was perceived as significantly less likely to be effective than donating non perishable food and food scraps to farmers for animal feed (Table 5). Composting is one of the food waste disposal methods that has dramatically increased in the United States since 1985 (Miller, 2007) although there are disadvantages to composting such as possible contamination of water and air (Department of Hotel, Restaurant, Institution Management, and Dietetics, 2002). Focus group participants considered composting to be a viable food waste disposal method. However, limited space to hold food scraps in foodservice operations was mentioned as a major barrier. Interestingly, foodservice administrators who obtained information from a waste contract management company perceived sending food scraps to composting sites more likely to be effective

Table 5. College and University Foodservice Administrators' Average Perceptions of Effectiveness of Food Waste Disposal Methods (N=63)	
Food Waste Disposal Methods	**Mean ± SD**
Send food scraps to composting site (s)	4.06 ± 1.17[a]
Use a food pulper to reduce the volume of the food waste	3.93 ± 1.20[ab]
Use garbage disposals to dispose food to sewage system	3.63 ± 1.41[abc]
Donate prepared food (ex. hot or cold foods) for the needy such as local food banks	3.41 ± 1.51[abc]
Send food waste to landfill along with other solid waste	3.33 ± 1.40[abc]
Donate food scraps to farmers for animal feed	3.11 ± 1.27[c]
Donate non-perishable food (ex. canned products) for the needy	3.00 ± 1.47[c]

Likeliness scales: 1, very unlikely; 2, unlikely; 3, unsure; 4, likely; 5, very likely
SD: Standard Deviation
Statistical significance was analyzed by a repeated measures MANOVA (Degrees of Freedom=6, F=8.07, P<0.001).
Values with different superscripts are significantly different (P<0.05) from each other analyzed by pairwise comparisons.

for food waste disposal than those who did not obtain information from a waste contract management company (4.43±0.68 vs. 3.81±1.36, P<0.05). Waste contract management companies may be helpful in solving a major barrier related to limited space to store food waste by frequently picking up food scraps or providing containers for collecting food waste.

The EPA recommends a hierarchy of food waste management methods that included source reduction, feed hungry people, feed animals, industrial uses, and composting to landfill/incineration in that order (EPA, 2009c). Using a pulper or a garbage disposal for source reduction is suggested as a primary method for source reduction. In focus group discussions, however, using a pulper was not the first choice for foodservice operations. Some foodservice administrators commented that because pulper equipment requires high maintenance, they did not plan to use one again. In contrast to those comments, foodservice administrators who completed the survey thought that using a pulper and garbage disposal would likely be an effective method of food waste disposal (3.93±1.20 and 3.63±1.41, respectively). The perception of effectiveness of using a food pulper for waste disposal was significantly higher than that of donating nonperishable food for needy people and food scraps to farmers for animal feed. The perception of effectiveness of using garbage disposals was not significantly different from other disposal methods (Table 5). Foodservice administrators serving residential dining halls perceived using a food pulper more likely to be an effective method of waste disposal (4.13±1.09 vs. 3.40±1.35, P<0.05).

Survey respondents perceived donating prepared food for the needy as the next most effective food waste disposal method (3.41±1.51). This method was not significantly different from any other food waste disposal methods. The liability issues related to donating foods have been a concern for foodservice administrators, including those working at contract managed operations (Aramark Risk Management, 2008; Kwon, 2009). Although not statistically significant, contract managed foodservice administrators perceived food donation as less likely to be effective than self operated foodservice administrators (2.89±1.49 vs. 3.70±1.43, P=0.053).

According to the EPA, landfill/incineration is the least recommended waste disposal method (EPA, 2009c). However in this study, sending food waste to landfills was not rated significantly different from any other food waste disposal method. Sending food waste to landfills was perceived less likely to be effective in foodservice operations with residential dining halls than at operations without them (3.11±1.43 vs. 3.94±1.12, P<0.05). This method was also perceived less likely to be effective in foodservice operations with cook chill than those without it (2.30±1.34 vs. 3.58±1.32, P<0.01) and by foodservice administrators using college and university web pages as an information source compared to those using other sources of information (2.95±1.41 vs. 4.05±1.07, P<0.01).

CONCLUSIONS AND APPLICATIONS

Food waste management in foodservice operations is possibly one of the least researched areas related to improving environmental sustainability even though food waste is closely related to increased food costs in operations. Through focus group discussions and a national survey, this study was able to determine opinions of a small group of college and university foodservice administrators regarding foodservice activities and methods of food waste disposal that could effectively reduce the amount of food waste in foodservice operations. Even though data from only a small number of respondents were available, this study was also able to determine significant differences in foodservice administrators' perceptions of likeliness of foodservice activities and food disposal methods according to other factors such as type of management, meal plan and food production, existence of a residential dining area, number of meals served, and source of information about food waste management.

The low response rate for this study with only 63 respondents was a limitation because the number was too small to use statistical analyses for several variables such as type of food production and source of information about food waste management. However, this study provides a glimpse of food waste management practices and waste disposal methods in college and university foodservice operations. Most foodservice administrators indicated they were interested in solid waste management and food waste management. However, they appeared to have different attitudes regarding food waste management based on their demographic characteristics and that of their operations. Results from this study can provide guidelines for governmental or educational agencies and alert the agencies to develop user friendly materials for foodservice operations.

Resources to support food waste disposal methods will vary according to the size of the college and university foodservice operation and type of management. Each administrator also should select effective methods of food waste management to suit their operation based upon available resources. The feasibility of using some food waste disposal methods such as composting, donation of food scraps to farmers and donation of foods to the needy will depend upon size of operation and location. Therefore, foodservice administrators should be well informed prior to implementing any food waste management programs.

Further study with a larger number of colleges and universities should be conducted to verify the accuracy and reliability of the results in this study. Food waste management research could also be expanded to school and healthcare foodservice operations in order to compare their preferred food waste reduction activities and food waste disposal methods with that of college/university foodservice facilities.

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