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College and University Dining Services Administrators' Intention to Adopt Sustainable Practices: Results from US Institutions

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Abstract

Purpose – This study examined college and university dining services administrators' (CUDSAs) intention to adopt sustainable practices.

Design/Methodology/Approach – The theory of planned behavior (TPB) including constructs of subjective norm, attitude, perceived behavior control, and personal norm, formed the theoretical framework. A web-based questionnaire was developed, pretested, and distributed to 535 CUDSAs in the U.S.A.

Findings – Results indicated that subjective norm (pressure from others) had the most influence on CUDSAs' intention to adopt sustainable practices, followed by attitude and personal norm. Including the personal norm construct in the TPB model reduced unexplained variance by 33.48%.

Research Limitations – Limitations of this research are generalizability of results due to use of a sample of U.S.A. members of a professional organization (National Association of College and University Food Services) and low response rate.

Practical implications – Results suggest that pressure from college administrators and students has the greatest impact on CUDSAs' decisions to adopt sustainable practices.

Originality/value – The question of why some university dining operations are models for sustainability and others have few sustainable practices has not been explored. The dining services director plays a key role in determining sustainability efforts for that operation. This research explored factors influencing a director's intention to adopt sustainable practices.

Keywords – theory of planned behavior, structural equation modeling, college and university dining services administrators, intention, personal norm, sustainability in foodservice.

Paper type – Research paper

Introduction

Corporations today are expected to meet economic and legal requirements and balance environmental and social impacts without damaging economic performance (Carroll, 1999; Palazzi and Starcher, 2006). Institutions of higher education are no exception (Baldwin and Chung, 2007; McKinne and Halfacre, 2008; Rauch and Newman, 2009). Considering the amount of energy and water that is used, and the amount of waste and pollutants generated from over 4,000 colleges and universities in the U.S., higher education institutions have huge impact and influence on the environment (Earl *et al.*, 2003). Administrators of many educational institutions are motivated to become more environmentally responsible (Earl *et al.*, 2003) for financial reasons (Eagan and Keiry, 1998). For example, reducing waste leads to reduced tipping fee charges for waste disposal in landfills or incinerators. Implementation of energy efficient and water conservation practices save on both utilities and water bills.

As a unit of higher education institutions, dining services are part of colleges' and universities' ecological footprints. The environmental and social responsibilities of college and university dining services (CUDS) include providing healthy food, teaching students good eating habits, educating students about how the food systems can impact the environment, and being good environmental stewards (Strohbehn and Gregoire, 2004). Some examples of sustainable practices that have been adopted by CUDS are recycling programs, reusable cups and containers, trayless dining, and farm to college programs (Chen *et al.*, 2010).

The target population for this study is those who are in charge of college and university dining services in the United States. Based on the size of the college or university, the position title may differ; some common titles include foodservice director, general manager, and auxiliary operation manager. Therefore, the term, College and University Dining Services Administrators (CUDSAs), is used in this article. To reach this population, a sample was selected from the National Association of College and University Services (NACUFS) 2008 directory, which includes names of the CUDSAs and their contact information. For this study, "sustainable practices" was defined as the actions that CUDSAs take to conserve resources, and "sustainability" was defined as activities or practices of college and university dining services staff to establish economic, environmental, and social balance, and maintain or improve the ecosystem.

Aims of the study

Sustainability studies had been conducted in the foodservice field focused on the following three areas: (1) examining how source-reduction activities could reduce operation costs (e.g., ARAMARK Higher Education, 2008; Eagan and Keniry, 1998; Kim *et al.*, 1997); (2) identifying adopted sustainable practices in foodservice field (e.g., Ozerkis and Gumucio, 2007; Sustainability Endowment Institute, 2009); and (3) examining farm to school/college programs in conjunction with local food usage (e.g., Daly, 2007; Murray, 2005; Strohbehn and Gregoire, 2004). There is no doubt that adopting sustainable practices is a trend in the foodservice industry. However, what factors prompt CUDSAs to adopt sustainable practices has not been addressed.

The theory of planned behavior (TPB) model is often used to analyze people's behavior (Ajzen and Madden, 1986). Although many studies using the TPB model have predicted personal environmental intention behaviors (e.g., Harland *et al.*, 1999; Kaiser and Gutscher, 2003), limited research has been conducted on managerial environmental intention behaviors and in the foodservice field. Moreover, researchers (e.g., Conner and Armitage, 1998; Harland *et al.*,

1999) have suggested that it is useful to include the personal norm construct into the TPB model when examining people's ecological intentions. Therefore, the aims of this study are to use the TPB model to examine factors affecting CUDSAs' intention to implement sustainable practices and examine the effect of adding the personal norm construct into the TPB model when studying CUDSAs' intention to adopt sustainable practices.

Review of literature

The TPB is an extension of the theory of reasoned action (TRA). Both models are widely used and popular conceptual frameworks for human action (Ajzen, 1991; Armitage and Conner, 2001). The TRA model assumes that a person's behavior can be predicted by intention and that this intention is influenced by personal attitude and personal perceptions of others' views toward the behavior (subjective norm) (Eves and Cheng, 2007). The only difference between the TRA and the TPB is that the TPB model takes self-efficacy or ability to perform the behavior of interest into account (perceived behavioral control) (Ajzen, 1991).

Intention. The TPB model indicates that intention is the best predictor of behavior (Kaiser *et al.*, 2007). Studies have shown that ecological behavioral intention was strongly related (Kaiser and Gutscher, 2003; Kaiser *et al.*, 1999; Lansana, 1992) or moderately related (Hines *et al.*, 1986/87) to ecological behavior.

The TPB hypothesizes that intention is based on three constructs: attitude toward the behavior, subjective norm, and perceived behavior control. Research by Kaiser and Gutscher (2003) found that attitude, subjective norm, and perceived behavior control explained 81% of the variance in an individual's ecological behavior intention, and intention determined 51% to 52% of that individual's ecological behavior. The following section describes these determinants of intention, their antecedents, and hypotheses for this study.

Attitude. When a person has a more positive attitude toward a behavior, the person will want to engage in a certain behavior (Hansen, 2008). Studies have shown that attitude has either a moderate (Axelrod and Lehmann, 1993; Smith *et al.*, 1994; Thøgersen, 2002) or a weak (Grob, 1995) relationship with ecological behavior. Therefore, the following hypothesis was proposed:

Hypothesis 1: CUDSAs' attitude toward sustainable practices will have a positive effect on their intention to adopt sustainable practices.

Subjective norm (SN). Subjective norm measures the influence of social pressures on individuals to perform or not to perform a particular behavior. This means if an individual perceives that people important to him/her approve (or disapprove) of a behavior, the individual is more (or less) likely to intend to perform it (Conner and Armitage, 1998). The relationship between subjective norm and ecological behavior ranged from non-significant (Shaw and Shiu, 2003; Thøgersen, 2002) to fairly strong (Arvola *et al.*, 2008). Thus, it was proposed that:

Hypothesis 2: CUDSAs' subjective norm will have a positive effect on their intention to adopt sustainable practices.

Perceived behavior control (PBC). Perceived behavior control is a person's perception of whether he/she has the means or opportunities to execute a behavior (Ajzen, 2005; Conner and Armitage, 1998). The relationship between PBC and behavior suggests that people tend to carry out behaviors that they have control over and try to prevent from engaging in behaviors over which they have no control (Conner and Armitage, 1998). There were inconsistent findings in the literature about the strength of this relationship between PBC and ecological behavioral

intention, with reports ranging from nonexistent (Arvola *et al.*, 2008) to very positive relationship (Kaiser and Gutscher, 2003). Based on findings from previous studies, the following hypothesis was considered:

Hypothesis 3: CUDSAs' perceived behavior control will have a positive effect on their intention to adopt sustainable practices.

Personal norm (PN). Personal norm is defined as feelings of strong obligations that people experience within themselves that prompt them to engage in social behaviors (Schwartz, 1977). Conner and Armitage (1998) suggested that it is useful to incorporate normative/ethical construct into the TPB model. Hines *et al.* (1986/87) reported a relationship between personal norm and ecological behavior. Harland *et al.* (1999) found that including personal norm could increase the proportion of explained variance of behavioral intention. Shaw and Shiu (2003) found a significant positive relationship between ethics and behavioral intention. Therefore, the following hypothesis was suggested:

Hypothesis 4: CUDSAs' personal norm will have a positive effect on their intention to adopt sustainable practices.

Knowledge. People will not act with proper behaviors without proper knowledge; therefore, factual knowledge is a prerequisite for any attitude (Stutzman and Green, 1982). Kaiser, Wölfing, and Fuhrer (1999) contended that even though knowledge may be the basis for any attitude, it would not have a strong relationship with ecological behavior because ecological attitude and behavioral intention reduce its power. Stern (1992) and Simmons and Widmar (1990) found knowledge differentiated people's involvement with specific problems.

Thus, it was proposed that:

Hypothesis 5a: CUDSAs' knowledge about sustainable practices will have a positive effect on their attitude toward sustainable practices.

Hypothesis 5b: CUDSAs' knowledge about sustainable practices will have a positive effect on their perceived behavior control.

Hypothesis 5c: CUDSAs' knowledge about sustainable practices will have a positive effect on their personal norm.

Personal value (PV). Personal value can be defined as beliefs relating to the desired behaviors or modes of conduct that guide an individual's actions (Hansen, 2008). Studies found that personal value had a strong effect on environmental behavior (Grob, 1995; Thøgersen and Grunert-Beckman 1997). Stern, Dietz, Kalof, and Guagnano (1995) suggested that personal value influenced the formation of attitudes. Therefore, it is proposed that:

Hypothesis 6a: CUDSAs' personal value will have a positive effect on their attitude toward sustainable practices.

Hypothesis 6b: CUDSAs' personal value will have a positive effect on their subjective norm.

Hypothesis 6c: CUDSAs' personal value will have a positive effect on their perceived behavior control.

Hypothesis 6d: CUDSAs' personal value will have a positive effect on their personal norm.

Past experience (PE). People who have had successful performance of a behavior in the past tend to perform the behavior in the future (Kashima *et al.*, 1993; O'Callaghan *et al.*, 1997). Also, in most cases, environmental-friendly behavior is repeated over and over again (Thøgersen, 2002). A relationship was found between past behavior and behavioral intention (Kashima *et al.*, 1993; O'Callaghan *et al.*, 1997; Thøgersen, 2002). Consequently, it was predicted that positive past experience with sustainable practices would increase the attitude-intention relationship. This led to the following hypotheses:

Hypothesis 7a: CUDSAs' past experience with sustainable practices will have a positive effect on their attitude toward sustainable practices.

Hypothesis 7b: CUDSAs' past experience will have a positive effect on their subjective norm.

Hypothesis 7c: CUDSAs' past experience with sustainable practices will have a positive effect on their perceived behavior control.

Hypothesis 7d: CUDSAs' past experience will have a positive effect on their personal norm.

The summary of hypotheses is provided in Figure 1.

Insert Figure 1

Method

Subjects and Procedures

The National Association of College & University Food Services (NACUFS) 2008 Directory listed member institutions not only in the United States of America but also in other countries such as Canada and Mexico. The criteria for inclusion in this study were (1) located in the United State of America; (2) having a university or college dining services operation; and (3) inclusion of the dining services administrator's email in the directory. A total of 555 CUDSAs met the inclusion criteria and were included in the study. Twenty of the 555 administrators were randomly selected for the pilot test and the remainder (n = 535) became the study sample. The sample was divided into four regions: Northeast, Midwest, South, and West, based on U.S. Census Bureau regions.

A web-based questionnaire was developed based on a literature review and input from an expert panel of eight hospitality management faculty members and dining service managers. A pilot test was conducted to seek comments on clarity and relevance of directions and statements in the questionnaire, length of time needed to complete the questionnaire, and any technical problems experienced. Minor revisions, such as grammar and clarification, were made to the questionnaire prior to distribution to the study sample. The study was reviewed and approved by the university's Institutional Review Board prior to data collection.

Dillman's (2007) recommendations were followed for design and distribution of a web-based questionnaire. An invitation e-mail and a cover letter e-mail were sent within a one-week period, and three follow-up emails were sent one week apart to encourage response.

Web Questionnaire

The Web-based questionnaire was designed with questions in nine sections: attitude toward sustainable practices, subjective norm, perceived behavior control, personal norm, intention to adopt sustainable practices, knowledge, past experience, personal value, and demographic information (Appendix A).

Data analysis

The Statistical Package for the Social Sciences (SPSS) Version 16.0 was used to conduct data analysis using frequencies, Pearson correlations, reliability, exploratory factor analysis, and independent-sample s *t* test and one-way analysis of variance. Confirmatory factor analysis, analysis of the measurement model, and structural equation modeling (SEM) analysis were conducted using the Analysis of Moment Structures (AMOS) Version 16.0.

Exploratory factor analysis, using maximum likelihood extraction with varimax rotation, was used to group the items together to be used as indicators for the various latent dimensions. Internal consistency was examined for each of the multi-item constructs included in the study (e.g., attitude, subjective norm, perceived behavior control, personal norm, and intention).

Anderson and Gerbing (1988) suggested using two-step modeling for SEM. The first step confirmed the measurement model using confirmatory factor analysis (CFA), which determined construct validation. In the second step, a series of structural equation models were tested to measure the adequacy of constructs in explaining the CUDSAs' intention to adopt sustainable practices and to measure whether adding personal norm (PN) as a predictor in the model would increase explanation of variance in behavioral intention. The maximum-likelihood estimation procedure was used to estimate the SEM with AMOS 16.0.

Evaluation of the measurement model included estimation of standardized Cronbach's alpha, and of the convergent and discriminant validity of the research instrument. To retain a scale, a Cronbach's alpha value of 0.70 is widely used; however, 0.60 or higher is considered acceptable in social psychology research (Robinson *et al.*, 1991). Convergent validity was indicated by factor loadings and average extracted variance. Average extracted variance was used to assess the validity of all constructs, with a target value of 0.50 or more (Fornell and Larcker, 1981). Hair, Anderson, Tatham, and Black (1998) indicated that loadings greater than 0.30 are considered important, loadings greater than 0.40 are more important, and loadings 0.50 or greater are considered to be very important. Correlations among factors were used to check discriminant validity ($p < .05$). Brown (2006) noted that in applied research a factor correlation that exceeds 0.80 or 0.85 indicated poor discriminant validity.

The overall fit of the model to data was examined through chi-square, comparative fit index (CFI), and root mean square error of approximation (RMSEA). Chi-square measures the difference between the theorized model's covariance matrix and observed covariance matrix. A large chi-square result indicates poor model fit. However, chi-square is not a sufficient test alone to assess model fit; it has been criticized for its sensitivity to sample size, assumptions, and distribution (Brown, 2006). Therefore, CFI and RMSEA were also calculated. By convention, models with a good fit have fit statistics above 0.95 for CFI and below 0.50 for RMSEA. There

is adequate fit if the RMSEA value is between 0.05-0.08 and CFI is between 0.90-0.95 (Brown, 2006).

Results

Demographic profile

Of the 535 CUDSAs emailed the study questionnaire, 13 (2.4%) e-mails were undeliverable and were returned to the sender. A total of 138 questionnaires were completed and returned, resulting in a 26.4% response rate. The response rate for the study was somewhat low; however, the available literature regarding response rates for web-based survey research are widely varying and can depend on the population sampled (Sax *et al.*, 2003). Factors such as invalid/inactive email addresses or use of "spam" filters by universities could have prevented some emails from reaching the intended sample. Some NACUFS members might consider email invitation as "spam" mail and ignore them. Self selection bias could have occurred if sample members had a strong interest or disinterest in the topic of sustainability (Wright, 2005).

Approximately one-third (34.6%) of respondents were female, 71.1% were older than 45 years of age, and 59.3% had a bachelor's degree. The majority of participants had been with the current institution (75%) and had held their current position (58.1%) for more than five years. More than one-third of the respondents (38.5%) worked with institutions with a total student enrollment of above 12,000. About one-third of the respondents (33.8%) were located in the Midwest, 63.2% worked in self-operated dining services, and 52.6% were associated with public institutions. As shown in Table 1, institutional characteristics of those who participated in the research are similar to the characteristics of the population of NACUFS member institutions.

Insert Table 1

Measurement model

Based on the results of exploratory factor analysis, the item PE2, "I am satisfied with the amount of resources," shared common variance with those in the PBC construct; therefore, PE2 was grouped with the PBC construct. All knowledge items except KNOW1 had low factor loadings (<0.1); thus KNOW1 was used as a single item to measure knowledge for further data analysis. Various studies have used a single item to measure a construct (e.g., Anakwe *et al.*, 2000; Braxton *et al.*, 2000; Wanous and Hudy, 2001). Due to model fit indices from the first CFA, a number of observed variables (ATT1, ATT4, SN3, SN4, SN5, PBC2, PBC3, PV3, and PV4) were deleted because of their low factor loadings and low squared multiple correlations to improve model fit. When the second CFA model was estimated; the overall model fit suggested a good fit of the data, with χ^2 (125, n = 133) = 182.60; RMSEA= .059 (90% CI = .039 - .077); CFI = .97; and χ^2/df=1.46. Table 2 shows the values of standardized Cronbach's alphas and factor loadings of observed items on the latent constructs. The range of standardized Cronbach's alphas was from 0.62 to 0.96; there were two constructs for which Cronbach's alphas value were under 0.7. As mentioned earlier, in social psychology research 0.6 or higher is considered acceptable (Robinson *et al.*, 1991). Therefore, the research instrument had acceptable internal consistency (Nunnally, 1978). The factor loadings are moderately high and all freely estimated parameter estimates are significant (p < .001), which indicated convergent validity (Anderson and Gerbing,

1988). The average extracted variance of the past experience was slightly below 0.50. Since the factor loadings were significant and the reliability of the construct was an acceptable value, the construct was retained.

Table 3 presents Pearson correlations among the study constructs. These correlations were used to examine whether there was an association among constructs for the proposed model and to ascertain discriminant validity. All latent constructs, except knowledge, were significantly associated ($p < .05$) with intention to adopt sustainable practices. Even though knowledge was not significantly associated with intention, the results indicated that knowledge had positive significant ($p < .05$) correlations with personal value, past experience, and personal norm latent constructs. The factor correlations ranged from 0.16 to 0.62 and were significantly different from one, thereby establishing discriminant validity.

Insert Table 2

Insert Table 3

Independent-samples *t* tests and one-way analysis of variance were used to examine whether study construct scores differed based on participant demographic characteristics. No differences were found in scores based on CUDSAs' age, gender, or region of the country in which the institution was located. A significant ($p < .05$) difference was found in the knowledge construct score based on CUDSAs' education level; those with a higher level of education had a higher sustainability knowledge score.

Structural equation model

The structural equation model (SEM) consisted of three exogenous constructs (knowledge, personal value, and past experience) and five endogenous constructs (attitude, subjective norm, perceived behavior control, personal norm, and intention to adopt sustainable practices). SEM results were estimated by maximum-likelihood procedures using AMOS 16.0. Standardized path coefficients and *t*-values for each path, as well as fit indices of the model, are presented in Figure 2. SEM results obtained for the theoretical model revealed an acceptable fit to the data: χ^2 ($df = 133$) = 189.85, $p = .001$; $\chi^2/df = 1.43$; RMSEA = .057 (90% CI = .037 - .075); CFI = .969. Squared multiple correlation (R^2) values for the endogenous construct ranged from 0.42 to 0.66.

The results from SEM estimation (Figure 2 and Table 4) revealed the following findings regarding the postulated hypotheses. Hypothesis 1, positing a positive relationship between attitude toward sustainable practices and intention to adopt sustainable practices, was supported ($\beta = .33$, $t(133) = 3.95$, $p < .001$). The proposed positive relationship between subjective norm and intention to adopt sustainable practices (H_2) was also supported ($\beta = .40$, $t(133) = 3.77$, $p < .001$). The third hypothesis, positing a positive relationship between perceived behavior control (PBC) and intention to adopt sustainable practices, was not supported. A significant ($p < .01$) and

positive path coefficient was observed between personal norm and intention to adopt sustainable practices (H_4) ($\beta = .24$, $t(133) = 2.63$, $p < .01$). The knowledge construct was not found to significantly ($p > .05$) affect attitude (H_{5a}), PBC (H_{5b}), or personal norm (H_{5c}). Personal value had a significant and positive path with attitude (H_{6a}) ($\beta = .55$, $t(133) = 5.39$, $p < .001$)., subjective norm (H_{6b}) ($\beta = .30$, $t(133) = 2.68$, $p < .01$), and personal norm (H_{6d}) ($\beta = .68$, $t(133) = 6.83$, $p < .001$). Hypothesis 6_c, positing a positive relationship between personal value and PBC, was not supported ($p > .05$). Past experience was postulated to have positive relationships with attitude (H_{7a}), subjective norm (H_{7b}), PBC (H_{7c}), and personal norm (H_{7d}). The respective path coefficients provided support for Hypotheses 7_a, 7_b, 7_c, and 7_d ($\beta = .24$, $\beta = .51$, $\beta = .74$, and $\beta = .29$, respectively).

Insert Figure 2

Insert Table 4

To explore whether personal norm influenced intention to adopt sustainable practices, two models were estimated and their results were analyzed. Model 1 hypothesized the inclusion of personal norm. Model 2 was very similar to Model 1; however, all paths associated with the personal norm construct were deleted.

Comparing the two models yielded a statistically significant difference, $\Delta\chi^2 = 95.57$, $p < .001$, indicating that including the personal norm construct in the TPB model reduced unexplained variance of behavioral intention by 33.48% ([95.57/285.42]×100) (Table 5). Including personal norm in the model resulted in a decreased effect of attitude and subjective norm on intention (Table 6), and the percentage of variance explained increased 11% for attitude, 3% for perceived behavior control, and 2% for intention.

Insert Table 5

Insert Table 6

Discussion and implication

The SEM results suggested that CUDSAs' behavioral intention to adopt sustainable practices could be predicted by subjective norm (pressure from others), attitude (personal views), and personal norm (personal feelings of obligation). The social pressures CUDSAs felt from university administrators and students (subjective norm) had the most influence on their intention to adopt sustainable practices. Such findings differ from those of Shaw and Shiu (2003), who studied self-identified ethical consumers whose intention was to purchase fair trade grocery products, and Thøgersen (2002), who studied ordinary wine consumers whose intention was to purchase organic red wine, both of which reported no relationship between subjective norm and intention. The findings from this study are similar to those of Arvola *et al.* (2008), who studied grocery shoppers in Italy, Finland, and the United Kingdom. These researchers found a strong relationship between subjective norms and intention to purchase organic apples and organic ready-to cook pizza.

The next "strongest" influencer of intention to adopt sustainable practices was CUDSAs' personal views (attitudes) on sustainable practices as good/bad or valuable/worthless, followed next by their feelings of personal obligation to sustainable practices (personal norm). Interestingly, CUDSAs' perceptions of the control they had over making sustainability decisions (perceived behavior control) did not have a significant relationship with their intention to adopt sustainable practices. Arvola *et al.* (2008) also had a similar finding that there was no significant difference in perceived behavior control and intention on buying organic pizza from grocery shoppers. Inclusion of the personal norm construct in the TPB model was an important addition, as its inclusion reduced the unexplained variance for intention by 33.48%. Such results emphasize the importance of CUDSAs' personal views and sense of personal obligation toward sustainable practices in their decision process.

Findings from this study suggested that CUDSAs' beliefs about sustainability and sustainable practices (personal value) not only influenced their attitude toward sustainable practices (which is consistent with research by Stern *et al.*, 1995), but also influenced their subjective norm and personal norm. Moreover, results from this study also indicated that past experiences with sustainable practices had a positive impact on attitude, subjective norm, PBC, and personal norm.

Limitations and suggestions for future research

There were several limitations that should be considered when reviewing the results from this study. First, the sample consisted of members of a professional organization (National Association of College and University Food Service). Generalizability of results to all CUDSAs may be limited depending on the representativeness of NACUFS to the larger population of college and university dining services administrators. The response rate for the study was somewhat low (26.4%); however, this response rate is not inconsistent with other literature regarding web survey research (Sax *et al.*, 2003). Respondents who had an interest in sustainability, the focus of this research, may have been more inclined to participate, possibly skewing results. Although the response rate was not high, the demographic characteristics of the participating schools were similar to the NACUFS population of schools, which establishes the possibility that these results may be generalized to the broader population of NACUFS CUDSAs. This study did not measure future behaviors, and thus could not test the applicability of that

portion of the TPB model in the CUDS setting. Future research could examine the effect of PBC and personal norm on specific sustainable behaviors (e.g., composting, farm to college, and trayless dining). In addition, it would be valuable to do a two-step study: first, assess which specific sustainable practices CUDSAs are intending to adopt in the future, then follow-up to see what their actual behaviors were.

Conclusions

Sustainability practices are increasing on college and university campuses. As part of colleges and universities, dining services are becoming more environmentally and socially responsible by adopting sustainable practices and educating students to be good environmental stewards. College and university dining services administrators play an important decision making role on the sustainability efforts in dining services operations.

The theory of planned behavior model has been a popular conceptual framework, often used to analyze people's behavior (Ajzen and Madden, 1986) in many different areas including personal environmental intention behaviors (e.g., Harland *et al.*, 1999; Kaiser and Gutscher, 2003). However, this study was the first to explore sustainable behaviors of CUDSAs. Results showed that CUDSAs' intention to adopt sustainable practices was influenced most by the pressure they felt from college administrators and students (subjective norm), their personal attitudes about sustainability, and their personal sense of obligation toward sustainability (personal norm). When CUDSAs are deciding which sustainable practices they should adopt, they might benefit from discussions with their students and administrators. Conversely, CU administrators and students who would like to see more sustainable practices in the dining services on their campuses should know that their views are valued by the CUDSAs and that by putting pressure on the CUDSAs changes in sustainable practices in dining services could result.

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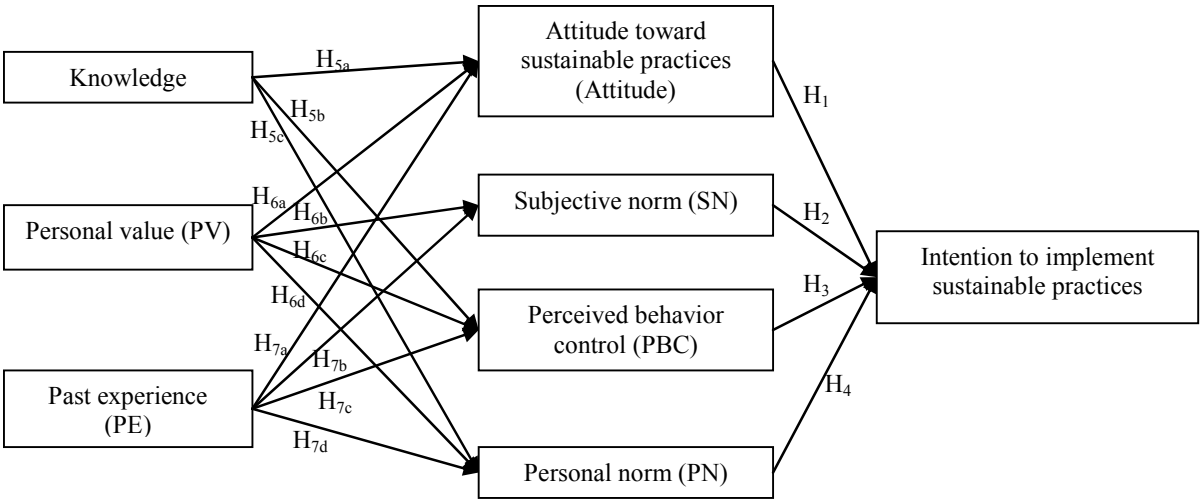

Figure 1. Summary of hypotheses of constructs relationships for college and university dining services administrators' intention to adopt sustainable practices

Table 1. Comparison of participant (n=138) and population (N=555) institutional characteristics

Variable	Description	Frequency	Sample Percent[a]	Population Percent[b]
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 participants (n=138)
[b] Percent of the total population (N=555)

Table 2. The Theory of Planned Behavior scale stems and Confirmatory Factor Analysis results (*n*=133)

Factor	Standardized Factor Loadings[a]	Standardized Cronbach's Alpha	AVE[b]	Mean	SD
Personal Value[c]		0.79	0.68		
Helping environment	0.92			6.47	0.85
Good for public relations	0.72			6.50	0.79
Past Experience[c]		0.62	0.46		
Satisfied with the outcome	0.72			4.76	1.46
Satisfied with customers' reaction	0.64			5.25	1.44
Attitude[d]		0.96	0.85		
Negative/ positive	0.95			6.59	0.69
Worthless/ valuable	0.91			6.54	0.72
Not needed/ needed	0.91			6.59	0.68
Unimportant/ important	0.92			6.59	0.64
Subjective Norm[e]		0.72	0.59		
Dining Personnel	0.66			5.60	1.17
External work colleagues	0.86			5.77	1.14
Perceive Behavior Control[c]		0.67	0.61		
Budget	0.52			4.21	1.52
Satisfied resources	0.97			3.91	1.71
Personal Norm[c]		0.88	0.73		
Obligation	0.93			6.00	1.16
Extra effort	0.94			6.11	1.02
Feeling guilty	0.67			5.44	1.77
Intention[c]		0.96	0.88		
Intending to adopt	0.92			6.30	0.87
Willing to try adopt	0.97			6.40	0.88
Planning to adopt	0.93			6.32	0.98

[a]All standardized factor loadings (λ) are significant at 0.001 level

[b] Average Variance Extracted (AVE) = [sum (λ^2)]/[sum (λ^2)+sum (1- λ^2)]

[c] Scale: 1 (strongly disagree) to 7 (strongly agree)

[d]Scale: 7 point semantic differential scale

[e]Scale: 1 (I should not) to 7 (I should)

Table 3. Pearson product-moment correlations among study constructs related to CUDSAs' intention to adopt sustainable practices

Constructs	1	2	3	4	5	6	7	8
1. Knowledge	1							
2. Personal value	0.190*	1						
3. Past experience	0.179*	0.542**	1					
4. Attitude	0.070	0.354**	0.262**	1				
5. Subjective norm	0.153	0.433**	0.363**	0.351**	1			
6. PBC[a]	0.041	0.408**	0.484**	0.258**	0.331**	1		
7. Personal norm	0.188*	0.585**	0.405**	0.619**	0.476**	0.327**	1	
8. Intention	0.062	0.455**	0.383**	0.558**	0.507**	0.242*	0.602**	1

* $p < .05$; **$p < .01$

[a]Perceived behavior control

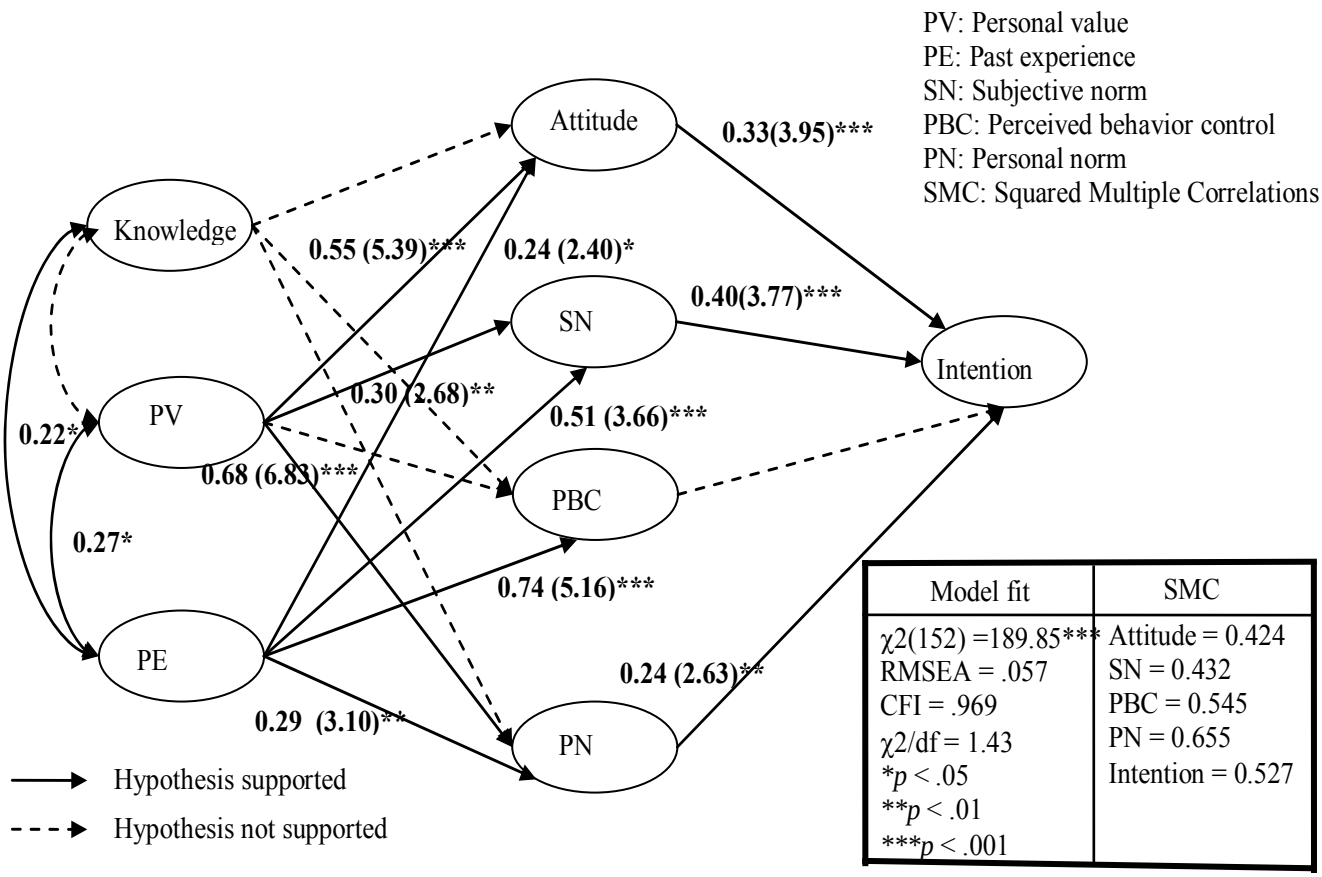

Figure 2. Causal relationships between study constructs related to college and university dining services administrators' intention to adopt sustainable practices

Table 4. Summary of hypothesized paths from SEM related to CUDSAs' intention to adopt sustainable practices

Hypothesized Path	Hypothesis
Attitude ⟶ Intention (H_1)	S
Subjective norm ⟶ Intention (H_2)	S
Perceived behavior control ⟶ Intention (H_3)	NS
Personal norm ⟶ Intention (H_4)	S
Knowledge ⟶ Attitude (H_{5a})	NS
Knowledge ⟶ Perceived behavior control (H_{5b})	NS
Knowledge ⟶ Personal norm (H_{5c})	NS
Personal value ⟶ Attitude (H_{6a})	S
Personal value ⟶ Subjective norm (H_{6b})	S
Personal value ⟶ Perceived behavior control (H_{6c})	NS
Personal value ⟶ Personal norm (H_{6d})	S
Past experience ⟶ Attitude (H_{7a})	S
Past experience ⟶ Subjective norm (H_{7b})	S
Past experience ⟶ Perceived behavior control (H_{7c})	S
Past experience ⟶ Personal norm (H_{7d})	S

S:supported; NS: not supported

Table 5. Comparison of two models using the Theory of Planned Behavior to examine CUDSAs' intention to adopt sustainable practices

Models	χ^2	Df	$\Delta\chi^2$	CFI	RMSEA
Model 1-including personal norm	189.85	133		.969	.057
Model 2-without personal norm	285.42	137	95.57***	.919	.091

*** $p < .001$

Table 6. Change in R^2 and standardized regression coefficients (β) for two Theory of Planned Behavior Models examining CUDSAs' intention to adopt sustainable practices.

Latent Constructs	Model 1 (with PN)		Model 2 (without PN)	
	R^2	β	R^2	B
Attitude → intention	.42	.33***	.31	.47***
SN → intention	.43	.40***	.44	.46***
PBC → intention	.55	-.11	.52	-.10
Intention	.53	-	.51	-

**$p < .01$, *** $p <. 001$
SN: subjective norm
PBC: perceived behavior control
PN: Personal norm

Appendix A: Questionnaire instrument.

Question	Item
Intention[a] (7-point scale)	
I intend to adopt more sustainable practices in my operation during the next year (1, extremely unlikely/ 7, extremely likely)	INT1
I will try to adopt sustainable practices in my operation during the next year (1, Definitely false/ 7, Definitely true)	INT2
I plan to adopt sustainable practices during the next year (1, Strongly disagree/ 7, Strongly agree)	INT3
Attitude[a] (7-point semantic differential scale)	
For me, sustainable practices are	
Bad/ Good	ATT1
Negative/ Positive	ATT2
Worthless/ Valuable	ATT3
Unexciting/ Exciting	ATT4
Not needed/ Needed	ATT5
Unimportant/ Important	ATT6
Subjective norm[a] (7-point scale)	
My dining services work colleagues think _____ implement sustainable practices (1, I should not/ 7, I should)	SN1
My external work colleagues (e.g., college/ university president) think _____ implement sustainable practices (1, I should not/ 7, I should)	SN2
Other institutions foodservice directors think _____ implement sustainable practices (1, I should not/ 7, I should)	SN3
General speaking, how much do you want to do what your dining services' work colleagues think you should do? (1, Not at all/ 7, Very much)	SN4
General speaking, how much do other institutions' foodservice administrators influence your opinions? (1, Not at all/ 7, Very much)	SN5
Perceived Behavioral Control[b] (PBC) (7-point scale)	
My budget allows me to implement sustainable practices (1, Strongly disagree/ 7, Strongly agree)	PBC1
The lack of information regarding how to start sustainable practices makes it difficult for me to implement them (1, Strongly disagree/ 7, Strongly agree)	PBC2
Whether or not to implement sustainable practices is not my control or my decision (1, Strongly disagree/ 7, Strongly agree)	PBC3
Personal norm[c] (PN) (7-point scale)	
I feel a strong personal obligation to have sustainable practices in my operation (1, Strongly disagree/ 7, Strongly agree)	PN1
I am willing to put extra effort into sustainable practices in my operation on a regular basis (1, Strongly disagree/ 7, Strongly agree)	PN2
I would feel guilty if I did not have sustainable practices in my	PN3

operation (1, Strongly disagree/ 7, Strongly agree)	
Knowledge[d] (True or false)	
Food waste is the single-largest component of discarded waste by weight in the U.S.	KNOW1
Packaging waste and food waste are two examples of solid waste generated by the foodservice industry	KNOW2
In general, it takes more energy to produce new products from recycled waste than from virgin materials	KNOW3
The purpose of Fair Trade is to alleviate global poverty and promote sustainability	KNOW4
Personal Value[d] (PV) (7-point scale)	
I think sustainable practices can help the environment (1, Strongly disagree/ 7, Strongly agree)	PV1
I think sustainable practices are good for an institution's public relations (1, Strongly disagree/ 7, Strongly agree)	PV2
In my opinion, my customer desire sustainable practices (1, Strongly disagree/ 7, Strongly agree)	PV3
Overall sustainable practices have reduced my operational costs (1, Strongly disagree/ 7, Strongly agree)	PV4
Past experience[d] (PE) (7-point scale)	
Overall, I am satisfied with the outcome of the current sustainable practices in my operation (1, Strongly disagree/ 7, Strongly agree)	PE1
I am satisfied with the amount of resources (e.g., labor and finances) I have to support sustainable practices in my operation (1, Strongly disagree/ 7, Strongly agree)	PE2
I am satisfied with my customers' reactions toward sustainable practices in my operation (1, Strongly disagree/ 7, Strongly agree)	PE3
[a] Questions were based on Ajzen, 1988	
[b] Questions were based on Ajzen, 1988 and were revised based on expert panel	
[c] Questions were adopted from Harland *et al.*, 1999	
[d] Questions were developed by the researchers based on literature review	

Demographic Information

1. Gender

   _____ Female _____ Male

2. Age

   _____ 30 or less _____ 31-35 _____ 36-40 _____ 41-45 _____ 46-50

   _____ Above 50

3. Level of Education

   _____ Bachelor _____ Master _____ Doctorate _____ Other

4. Number of years working with current institution _____

5. Number of years in charge of college or university dining services _____

6. Number of years in current position _____

   Please indicate your position title _____

7. Number of students enrolled in your college/ university

   _____ Under 4,000 _____ 4,001- 12,000 _____ Above 12,000

8. How is your foodservice operation managed?

   _____ Self-operated

   _____ Contract managed

9. What is your college's/ university's status?

   _____ Private

   _____ Public