IMPLEMENTATION OF SUSTAINABLE PUBLIC PROCUREMENT PRACTICES AND POLICIES: A SORTING FRAMEWORK

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ABSTRACT. In general, there are many disincentives standing in the way of promoting change in public procurement practices by government agencies. Because engaging in sustainable purchasing requires some level of entrepreneurialism and risk-taking, a sorting framework is adopted to gauge whether some organizations are systematically more likely to pursue sustainable public purchasing (SPP) efforts than others. One-way analysis of variance and other methods are applied to a survey of public procurement practitioners across over 300 governments in the U.S. Results strongly suggest that agencies of various scope and reach tend to abstain from aggressively pursuing SPP efforts. However, when they do employ SPP, these efforts tend to be quite variable across and within levels of government and organizational size. In an effort to bridge theory with empirical data, a strong case can be made that the current state of SPP in the United States is the result of random and very cautious experimentation with little systematic pattern to SPP adoption.

INTRODUCTION

It is relatively recently that researchers have begun to pay increasing attention to the ways in which governments buy goods and purchase services in a sustainable way, and this is probably because scholarly studies tend to be dominated by purchasing activities in the

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private sector (see Touboulic & Walker, 2015; also see Walker et al., 2012). However, there are stark differences between organizational objectives in the public and private sectors, especially when it comes to the motivations that contribute to each's bottom line (for a fuller discussion, see Steinfeld, McCue, & Prier, forthcoming). It is no secret that while the private sector is obsessed with profitability and existing supply chain compatibilities that contribute to a return on investment (Vachon & Klassen, 2007), the public sector is rightly concerned with issues such as equity, market structure, and differential impacts flowing from its buy and spend decisions, especially in the area of sustainable procurement.

Public procurement is defined as the "designated legal authority to advise, plan, obtain, deliver, and evaluate a government's expenditures on goods and services that are used to fulfill stated objectives, obligations, and activities in pursuit of desired policy outcomes" (Prier & McCue, 2009). Given the size and importance of government purchases, procurement decisions are, in the best of cases, supposed to be aligned to contribute to targeted results of government policy through detailed rules and procedures. Across different types and levels of government, procurement practices are designed to treat bidders equally through transparent specifications and criteria. Add to this that public procurement can dominate national (and possibly international) markets due to the sheer size of government spend – in some instances exceeding 50 percent of GDP (ADB, 2011; Eurodad, 2009; IISD, 2007; UNDP, 2010), and one can see that the importance of public procurement is hard to miss (Preuss, 2009).

Procurement is called sustainable when it integrates requirements, specifications and criteria that are compatible and in favor of the protection of the environment, and in support of economic development, while also accounting for other societal considerations, such as social justice and equity (Schwerin & Prier, 2013; also see Brammer & Walker, 2011). Consequently, the adoption of the principles of sustainable development within public procurement can provide industry with both production signals and incentives to develop new and better technologies and to encourage sustainable patterns of behavior.

There are other potential benefits from sustainable purchasing such as growing evidence that at least for some products, overall life-

cycle costs for sustainable products can be less than those purchased when they were the cheapest option at the time of purchase (see PricewaterhouseCoopers, Significant and Ecofys, 2009). Given this situation, it can be difficult to see why governments would not be paving the way toward utilizing sustainable public procurement – if only through lowering costs along with contributing to other areas of public policy such as economic development, etc. (see Schwerin & Prier, 2013). Indeed, recent scholarship has even discussed how government can become a catalyst in the market through leading by example when utilizing sustainable products and services (see Schwerin, Prier, & McCue 2016; also see Kjöllerström, 2008). Perhaps this is why focus has intensified on sustainability in public procurement within and across governments (for example, see especially Walker & Brammer, 2012; also see Bratt et al., 2013; Goswami, Meher Diljun, & Srivastava, 2013; Lehtinen, 2012; Morgan & Sonnino, 2007; Preuss, 2009; Schwerin & Prier, 2013; Thomson & Jackson, 2007; Swanson et al., 2005; Walker & Brammer, 2009; Walker & Phillips 2009; Walker & Preuss, 2008; Warner & Ryall, 2001).

Although there can be many different ways to think about sustainability and its dimensions (for example, see Seghezzo, 2009; de Faro Adamson & Andrew, 2007; Hope & Fowler, 2007; also see Yale et al., 2005), this paper adopts a three pillars approach to sustainability that includes economic; social; and environmental dimensions. Otherwise known as the "triple bottom line" (TBL), this framework sees sustainable public procurement (SPP) as a purchasing and investment process that takes into account the environmental, economic, and social impacts of the government entity's spending.

Given the arguments for engaging in sustainable public procurement, one may rightfully wonder: to what extent are goods and services procured in a sustainable way, and what might be some contributing factors that might help or hinder sustainable public purchasing (SPP)? This is the main question addressed by this paper.

A Sorting Framework

This paper adopts an economic sorting theoretical framework to aid in understanding the state of sustainable public purchasing (SPP), and while theory-building and testing appears to be relatively sparse,

there has been movement toward examining these issues, especially in the private sector (see Touboulic & Walker, 2015). This paper adds to the theoretical and empirical literature by considering both incentives and disincentives to SPP implementation. While the process of public procurement takes place within a complex political environment with multiple stakeholders who often have conflicting goals (McCue & Prier, 2007; also see Loader, 2007), what is not so apparent is the fact that even though procurement procedures are subject to transparent public scrutiny by citizens and taxpayers (Walker & Brammer, 2009), there are few incentives to change – even if the proposed transformations can make society substantially better off.

Political economists use the term sorting as a way of thinking about how markets partition agents (see Tiebout, 1956). Although much of the recent literature on sorting deals with individuals and their preferences (Fouarge, Kriechel, & Dohmen, 2015; von Siemens, 2012), there is a growing literature examining organizational sorting behavior (see for example Earnhart & Leonard, 2016). While a sorting process – whether intentional or not – can reveal much information and can suggest many implications about collective actions for both market and non-market outcomes (see Timmons, Kuminoff, & Smith, 2013). This paper proceeds under the following premise: if governments operate within an environment where they are responding to citizens who have a preference for sustainable public purchasing, they would have strong incentives to develop a reputation for sustainable buying. In effect, governments would try to differentiate themselves from other governments by signaling they engage in SPP to enhance their reputations in this policy area.

However, if governments avoid utilizing SPP, other motivations may be overriding the signaling effect of differentiating themselves from their cohorts that may include the lack of tangible incentives and political support; the perception by many that green products cost more; the lack of legal expertise in applying sustainable criteria; the lack of training, appropriate tools, and information; a dearth of cooperation between authorities and upper management; and limited established environmental criteria for products/services. Indeed, it may be all of these which contribute to disincentives in adopting SPP in the public sphere (see Schwerin, Prier, & McCue, 2016; also Schwerin & Prier, 2013).

Because of these disincentives in the public sphere, a core anchor of public procurement organizations is both procedural and outcome risk-aversion, especially those requiring changes that might produce noticeable variation in public policy outcomes. So lacking proper incentives to experiment and to take risks, the actual underlying organizational motivation is to procedurally hedge against gambling on outcomes that may or may not have a positive payoff (for a fuller discussion of bureaucratic incentives, see Downs, 1967). Indeed, there is a substantial asymmetric structure to bureaucratic change when one considers potential public reactions to engaging in SPP: do things well and the public remains silent with no meritocratic payoff for the attempt at increased efficiency or effectiveness. However, do something wrong and the result is likely to be a public firestorm with an avalanche of criticism and targeted scrutiny on both the organization and its members.

Up to this point, the discussion about the asymmetric nature of public procurement procedural evolution is merely theoretical. This paper proposes to move beyond the theoretical to indirectly test the proposition that procurement organizations are inherently risk-averse which will lead them to have mixed results in pursuing sustainable public purchasing (SPP) efforts. Although this paper does not directly test the presence or absence of sorting *per se*, it examines whether the data are consistent with nonsorting characteristics expected in a risk-averse environment. Traditionally, economists have conceptualized and confirmed the negative effect of risk aversion on entrepreneurship selection (Cramer et al., 2002). In the context of engaging in SPP – something which is an entrepreneurial activity – a sorting framework suggests that organizations in the public sphere which are likely populated by risk-averse procurement practitioners are also unlikely to sort themselves and thus organizationally abstain from aggressively pursuing SPP efforts. But is this the case? Since there is little empirical research that directly investigates the importance that sustainability considerations may have on a public organization's procurement decisions, this paper is an attempt to address this shortcoming in the literature.

Agency procedures and policies reflect discrete choices made by a presumed population of fairly homogeneous agents, in this case, risk-averse procurement practitioners. Nonetheless, there is a wide array of observable features that distinguish how public procurement

is provided such as the level of government and procurement organizational configuration under which practitioners operate. It is likely that organizational choice depends on historic constraints, informational distributions, political and economic incentives, as well as individual preferences. So treating government agents as risk-averse creates incentives for practitioners and their organizations to abstain from entering risky areas of procurement. Thus to summarize the sorting framework within the context of SPP: *ceteris paribus*, given the breadth of disincentives, there appears to be little payoff from trying new things. In other words, procurement performance is typically *not* based on a comparison of how well other governments procure goods or services unless there is demonstrable efficiency in a particular procedure, or there is a net payoff from reputational signaling between governments in the area of SPP.

So in a strategic sense, while government procurement agencies may be a significant part of the local or regional economy, these organizations (and presumably their respective practitioners) often operate within an anti-entrepreneurial bureaucratic environment outlined here, public procurement agencies are incentivized to reduce their exposure to social comparisons e.g. to remain as invisible as possible and not take chances. In effect, the expectation flowing from a sorting framework is that no government is incentivized to take the obvious lead on SPP. If, however, governments operated with the intention to signal SPP differentiation in order to align policy with citizen preferences i.e. SPP was viewed as having a net positive payoff, governments would be instituting SPP as fast as possible.

To be clear: the whole process associated with utilizing SPP principles and procedures entails tremendous sunk costs that may not be recoverable by those organizations and practitioners who would develop the appropriate procedures nor by the participating governments themselves. Moreover, there are surely strong free-rider incentives for organizations who would consider committing to SPP by encouraging other government agencies to go first and who would then suffer the costs of trial and error associated with SPP adoption. Thus there is no obvious first mover advantage. One only has to consider the time and expense of governments and staff to train practitioners in SPP buying to quickly understand the disincentives of agencies moving from the default position associated with traditional procurement practices. In addition, there are substantial sunk costs

that minimize voluntary procurement participation, and the costs are likely contingent on organizational size or government reach and complexity of spend. For all of these reasons, empirical analysis on the extent and variation that governments pursue SPP is an important step in understanding the drivers and hurdles of SPP adoption.

While research exists that focuses on the degree to which organizations work with suppliers to improve environmental sustainability along the supply chain (Green, Zelbst, Meacham, & Bhadauria, 2012), this study is aimed at assessing SPP commitment by governments within their own organizations.[1] Moreover, although it is quite apparent that much of the literature analyzes the single environmental dimension of sustainability without paying much attention to the other two components of the TBL (see Miemczyk, Johnsen & Macquet, 2012; Winter & Knemeyer, 2013), this paper evaluates all three elements of the TBL.

This paper proposes to move beyond the theoretical to indirectly test the proposition that procurement organizations are inherently risk-averse by examining organizational hurdles and drivers of sustainable public purchasing (SPP) efforts. In turn, it is expected in the presence of risk-aversion that government procurement agencies will have, at best, mixed results in pursuing sustainable public purchasing (SPP) efforts. Ultimately, this project examines the state of SPP in the U.S. public sector by examining whether the data are consistent with nonsorting characteristics that would be expected in a risk-averse bureaucratic environment. To do this, analysis is conducted to map the extent to which goods and services are procured in a sustainable way by observing factors that might help or hinder sustainable public purchasing (SPP).

From a sorting perspective, it is theoretically plausible that the utilization of, and commitment to sustainable criteria in procurement decisions will be contingent on two independent variables: level of government and in some cases, organizational size. Indeed, the focus of the analysis centers on the contextual variables associated with the breadth of environmental criteria and the TBL as well as variation in elements that drive sustainable purchasing in the public sector. Thus this analysis begins with three straightforward hypotheses that include:

H_1: Levels of government will not differentially weight environmental criteria in their purchases

H_2: The size of procurement organizations will not impact the net efforts toward SPP implementation

H_3: Procurement organizational size and level of government has no bearing on the breadth of TBL coverage.

In effect, all three hypotheses presume that there will be null results which are consistent with a nonsorting outcome expected from a risk-averse environment. Essentially, the empirical tests conducted in this paper answer the question: is there SPP commitment sorting exhibited by level of government or organizational complexity? Given the operationalized data explained in the next section, if there is a lack of sorting across levels of government, readers should expect overlapping distributional ranges. If there is sorting within levels of government, expectations are for witnessing a narrower and discrete distributional dispersion of data. Finally, discerning commitment to elements of the triple bottom line (TBL) is essential to understanding the status of SPP across the three pillars, and this paper examines the breadth of devotion to the TBL across levels of government to see if that commitment is also contingent on organizational size.

METHODS

Based on quantitative data from different levels of governments in the United States, the units of analysis are the procurement agency and/or the practitioner within the agency who was the respondent to a 2012 survey gathered from the National Institute of Governmental Procurement (NIGP), a member driven professional association with more than 16,000 members across the U.S. and Canada.[2] An email was sent to the NIGP members on June 29th and again on July 9th informing them of the survey issuance. The survey was administered online using surveymonkey.com. July 19, 2012 was the last date when responses were accepted.

A total of 2,280 procurement practitioners were invited to participate in the survey. Out of those contacted, 340 (15%) completed the survey by the closing date, and after appropriate data-cleaning, there remained 337 usable responses. For a number of questions, respondents were provided open-ended response

categories to qualify and provide more detailed answers than the close-ended options available.

There are a number of challenges to using a sample pool based on organizational affiliation, not least among them is the external validity or generalizability of the findings. Determination of the population of the study is difficult because no list of all procurement practitioners exists – let alone their characteristics, entity or agency affiliations, etc. Thus a major assumption of the data is that they are comprised of appropriate cases of agencies and their respondents who are most likely to be knowledgeable of the facts and specifics concerning each question. A counterfactual assumption is that the average agency-respondents – when clustered into groups – typically reflect those who were excluded. Preliminary agency-respondent examination reveals a diverse range and representation of NIGP's membership across different levels, types, and size of governments and organizational architectures (as well as respondent organizational position), so the relative confidence of generalizing the results to other government agency settings – although it invites caution – also sufficiently contributes to knowledge to warrant consideration.

When appropriate, preliminary checks of variable distributions were made against those agency-respondents who were excluded from the analysis, and there did not appear to be any systematic bias between those who were included or excluded, and although there is no good way to deal with the issues associated with missing data, this has been adequately discussed elsewhere (see Tabachnick and Fidell, 2013, 62-72; also see Cohen and Cohen, 1975; and Rummel, 1970). It was elected to rely on the data available as opposed to imputing and extrapolating data that was not obtained, either through the intentional withholding of the data or due to other reasons for its absence. Hence the resulting analysis and findings rest upon firmer ground for the exploratory purposes herein.

The data analysis package used in this study was SPSS Version 23. In this paper, because there are statistics reported on unconditional responses and other statistics that are contingent upon other variables in order to evaluate sustainability issues in the public sector, the number of respondents may vary across tables and tested hypotheses.

While the current analysis is concerned with agency behavior (as opposed to respondent attitudes), Table 1 reports the distribution of agency-respondents by their respective procurement agency positions and level of government.[3] Columns 1 and 2 in the table are managerial respondents while columns 3 through 5 are comprised of non-manager respondents. From a total of 335 usable observations, 69.8% (n=234) of the procurement respondents are in management while 31.2% (n=91) are either agent; buyer/specialist; or staff/other. Moreover, while the modal government is the city/municipal category, there is good variation across the four levels of government. For instance, education or special districts encompass 29.6% of the observations; cities or municipalities comprise 32.2%; counties and regional governments make up 21.5% of the data; and 16.7% of the governments are states. This allotment is likely to enhance the robustness of any conclusions, because the distribution of government levels is not dominated by one government category.

TABLE 1
Agency-Respondents by Job Position and Level of Government

|	Job Position					
	(1)	(2)	(3)	(4)	(5)	
Level of Government	Dir. / CPO			Manager	Agent	Buyer or Contract Specialist
Educ or Spec Dist[a]	41.4% (41)	34.3% (34)	7.1% (7)	8.1% (8)	Staff/ Other	Total
Cities or Municipal[b]	26.9 (29)	33.3 (36)	18.5 (20)	13.0 (14)	9.1% (9)	29.6% (99)
Counties / Regional	43.1 (31)	34.7 (25)	13.9 (10)	4.2 (3)	8.3 (9)	32.2% (108)
State[c]	30.4 (17)	37.5 (21)	3.6 (2)	21.4 (12)	4.2 (3)	21.5% (72)
Total	35.2% (118)	34.6% (116)	11.6% (39)	11.0% (37)	7.1 (4)	16.7% (56)

Notes: [a]This category includes "other" throughout the analysis (N=5).
[b]This category includes towns, townships, and village throughout the analysis (N=3).
[c]This category includes "Federal agency" throughout the analysis (N=1).

Moreover, Figure 1 reports the distribution of the four types of organizational structures under which the practitioners in this survey work. Obviously, it shows that the largest group of practitioners operates under a centralized with delegated authority procurement system, and this is consistent with previous surveys of the NIGP membership (see Prier and McCue, 2014). The smallest group conducts procurement within a purely centralized regime, while a mix of decentralized with central review and centralized contracting with decentralized buying off established contracts comprises a majority of respondents.

FIGURE 1
Distribution of Respondents' Procurement Organizational Structures
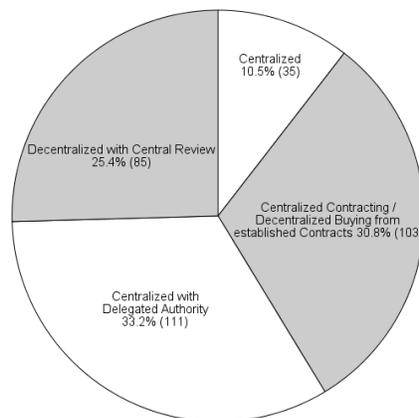
To baseline practitioners' attitudes toward SPP, respondents were asked about some perceived benefits from sustainable public procurement, and results are reported in table 2. Looking at the first three rows in the table which report the three pillars comprising the triple bottom line, the environmental pillar appears to be the most important of the three pillars as 72% (n=203) of respondents believe that it is often or always a perceived benefit from SPP. Among the three pillars, the social aspects of SPP are deemed to be often or always beneficial by 57.1% (n=160) of the respondents, and trailing at the back of the pack of these three are the financial benefits where only one-third (n=92) say it is often or always beneficial.

Looking at the remaining five perceived benefits in the table, one can see that the most important is as "an example to others" as 73.8% of respondents identified this as a perceived benefit. Perhaps surprisingly, one in five respondents don't know the benefits to employment flowing from SPP. These results suggest that being an example to others is a primary motivator that explains practitioners' attitude towards SPP, but future research will be needed in order to robustly confirm this hypothesis.

TABLE 2
Perceived Benefits from Sustainable Public Procurement

Benefit Type	Never	Sometimes	Often	Always	Don't Know
Environmental (n=282)	1.1% (3)	19.5% (55)	40.1% (113)	31.9% (90)	7.4% (21)
Social (280)	2.1 (6)	28.2 (79)	40.7 (114)	16.4 (46)	12.5 (35)
Financial (282)	2.5 (7)	56.0 (158)	28.0 (79)	4.6 (13)	8.9 (25)
Example to Others (282)	1.1 (3)	15.2 (43)	39.0 (110)	34.8 (98)	9.9 (28)
Product Innovation (277)	2.2 (6)	30.3 (84)	43.0 (119)	13.0 (36)	11.6 (32)
New Markets (279)	2.5 (7)	35.5 (99)	36.6 (102)	10.8 (30)	14.7 (41)
Employment (280)	5.7 (16)	46.4 (130)	23.6 (66)	4.6 (13)	19.6 (55)
Best Value-for-Money (281)	2.8 (8)	62.3 (175)	22.1 (62)	4.3 (12)	8.5 (24)

Specification and Data

Although the analysis to this point remains agnostic concerning the exact form of the relationships of these variables, there is no theoretical reason to suspect that in general, Y and the two Xs are not related, so $Y = f(X_1, X_2)$ where

   Y = utilization of, and commitment to sustainable criteria in procurement decisions

X_1 = government level (a proxy for procurement scope)
X_2 = procurement agency size (FTEs)

Consistent with the conservative statistical methodologies that will be employed to explore current sustainability practices, throughout the analysis, non-responses were dropped in order to be conservative with the data. In other words, it was elected to rely upon the available data and deflate the concerns over Type I errors instead of subjecting the data to unverifiable imputational characteristics or *ad hoc* parametric assumptions.

First Dependent Variable (Y_1)

H_1: Levels of government will not differentially weight environmental criteria in their purchases

In order to test the first hypothesis, a measure of environmental criteria over mundane items and services was obtained through a series of questions that asked: To what extent have environmental criteria been taken into account when purchasing the following products and services? Forced answer choices included 10 items and services such as food; paper; furniture; it equipment; vehicles; cleaning products; energy services; waste management; office supplies; and building construction.

Through a series of recodes for each of ten products and services, the Environmental Criteria Index was produced which can potentially take the values ranging from 0 to 20.[4] The mode of 9 was similar to the overall mean for this index was 9.0534 (N=281; s = 4.4200, SE = .26638). The actual range for all sample respondents was 0 to 20. This index of Environmental Criteria is based on the following coding scheme for each component product and service:

0 = Don't Know/Not at all
1 = Partially
2 = Mostly

Second Dependent Variable (Y_2)

H_2: The size of procurement organizations will not impact the net efforts toward SPP implementation

The second hypothesis is tested by looking at contingent variation in the net measurable drivers and barriers of SPP efforts. A three-step

approach was utilized in creating a final index that measures actual SPP efforts – both positive and negative – in the respective respondents' agencies. The first step captured data on 22 potential primary organizational drivers of SPP where all applicable drivers could be selected. The survey instrument listed 22 potential drivers which included doing "what's right" for the planet/environmentally beneficial; green factors; human health considerations; cost reduction/savings; product performance; durability; availability; social impact; tax incentives; increased efficiency; compliance with legal and regulatory requirements; compliance with organizational requirements; improving public relations; recruiting environmentally concerned staff; competitive advantage; responding to concerns of public/customers/clients; interest from senior management; government incentives or taxes; employees; interest from political leadership; avoiding risk; and building brand image.

Through a series of recodes for each of 22 potential primary drivers that the respondent thinks reflect her organization's *commitment* to SPP, a SPP Primary Drivers Index was produced which can take the values ranging from 0 to 22. This index of SPP Primary Drivers is based on the following coding scheme for each component product and services:

0 = Not chosen
1 = Chosen

The second step captured data on 20 potential primary organizational barriers of SPP where all applicable barriers could be selected, and these included the current economic recession; lack of information on financial benefits; lack of adequate funding; costs of implementation; lack of participation from necessary individuals/departments; lack of information on environmental benefits; economic conditions; lack of information on green products and services; lack of return on investment; procurement decisions do not account for life-cycle costs; shortage of workers with knowledge/skills; lack of staff training for procurement officers; lack of practical tools (i.e. handbooks, databases); lack of support from administration; lack of guidance from organizational strategic objectives; environmentally unconcerned organizational culture; shortage of training programs; lack of political support; government regulations; and federal level policies.

Again through a series of recodes for each of 20 potential primary barriers that the respondent thinks reflect her organization's *indifference* to SPP, a SPP Barriers Index was produced which can take the values ranging from 0 to -20. This index of SPP Barriers is based on the following coding scheme for each component product and services:

0 = Not chosen
-1 = Chosen

The third step combined these two indexes to produce a final index labeled "SPP Effort Index" that measures the net commitment to SPP procurement in these public agencies. While the overall mean for the SPP Effort Index was 2.2493 (N=337; s = 4.89262, SE = .26652), the SPP Effort Index could potentially range from -20 to +22. However, the actual range for all sample respondents was -12 to +21.

Third Dependent Variable (Y_3)

H_3: Procurement organizational size and level of government has no bearing on the breadth of TBL coverage

The third tested hypothesis assesses the breadth of devotion to the triple bottom line (TBL) to evaluate if this TBL breadth is contingent on two independent variables. The dependent variable (TBL Index) is measured by asking respondents the question: Does your organization's approach to SPP include one or more aspects of sustainability? (All applicable could be selected). This survey question listed four responses which included economic; social; environmental; and none, and through a series of recodes, elicited a TBL Index with the following categories:

0 = None
1 = 1 Aspect of TBL
2 = 2 Aspects of TBL
3 = All 3 Aspects of TBL

Both the potential and actual range for this index was 0 to 3, the mode for this index was 0. The overall mean for the TBL Index was 1.3709 (N=337; s = 1.13996, SE = .06210). The data show that while 31.5% (N=106) of government agencies do *not* take any of the three aspects of the TBL into account, 21.7% (N=73) of organizations

include all three pillars in their approach to SPP. In addition, 11.9% of organizations include the environmental pillar only; 7.7% the economic only; and 2.1% the social pillar only of TBL.

To summarize the three dependent variables (Y_1, Y_2, and Y_3): in accordance with theoretical expectations, high values on these three indexes should indicate greater utilization of and commitment to sustainability criteria when making procurement decisions. Table 3 reports the descriptive statistics for the three dependent variables.

Normality tests for the three indexes were conducted. Both the Kolmogorov-Smirnov and the Shapiro-Wilk tests for normality suggest that the null hypothesis (H_0: $Index_i$ is normal) should be rejected. In other words, because these were statistically significant, we would typically reject the null by concluding that the indexes are nonnormal. However, it is widely known that these tests are susceptible to error – especially given the wide ranges of the indexes. Indeed, the wider the range, the less likely to get a false positive on the null. Moreover, the plots and descriptives strongly suggest that the nonnormality is due to the spiked preponderance of 0 values across the three indexes which when excluded, show a very normal distribution. In conclusion, a visual inspection, along with the skewness and kurtosis statistics themselves, suggest that transformation is unnecessary.[5]

TABLE 3
Descriptive Statistics for the Three Dependent Variables

	$\overline{X}$ (S.E.)	MD	St. Dev.	Range (Min-Max)	Normality	
					Skew (S.E.)	Kurt (S.E.)
Index 1 (Environmental Criteria Importance)[a]	9.053 (.264)	9	4.42	20 (0 to 20)	.116 (.145)	-.244 (.290)
Index 2 (SPP Net Effort)	2.249 (.267)	2	4.89	33 (-12 to 21)	.557 (.133)	1.268 (.265)
TBL Index	1.371 (.062)	1	1.14	3 (0-3)	.121 (.133)	-1.406 (.265)

Note: [a] Index 1 had n=281 with 56 missing cases. The other two dependent variables had n=337.

First Independent Variable (X_1)

The two independent variables in this study are believed to provide important information about the general scope of procurement in different settings. In accordance with theoretical expectations, high values on these two variables should indicate greater procurement scope and complexity. The first independent variable is level of government, and it is conceptualized as an ordinal-level proxy for the reach and scope of the government procurement agency (see Table 1 for descriptive statistics). Intuitively, the coding scheme reflects that governments empowered to accomplish a wider range of programs and policies for citizens (e.g. states and provinces) will have a broader reach than governments created for more specific tasks, such as special districts or public schools. By collapsing the original nine categories into four, government reach and scope is measured by the type of entity or government level coded in the following way:

1 = Education or Special District [6]
2 = City/Municipal
3 = County/Regional
4 = State/Provincial

Second Independent Variable (X_2)

Size of the government procurement agency was operationalized by the actual procurement office size as measured in the total number of full-time equivalent employees (FTEs). Theoretically, size is presumed to be an important factor in measuring complexity and serves as a surrogate for organizational specialization with the following proposition: larger organizations exhibit more task specialization. Hence larger organizations with more task specialization will be more likely to exhibit behaviors and discretion in procurement decisions. This is because the larger the size, the greater the likelihood that more procurement decisions can encompass sustainable criteria in decision-making. In other words, larger Ns are associated with greater decision-making inputs than smaller Ns, *ceteris paribus*. To illustrate the extreme case, consider that in the absence of directives to buy green, a procurement agency with one employee is less likely to take account of sustainable criteria than an agency with 25 employees, all things being equal. For ease of

analysis, the original continuous FTE measurement was recoded into an ordinal variable with the following codes:[7]

   1 = small agency
   2 = medium agency
   3 = large agency.

Table 4 reports the descriptive statistics for the three measures of the second independent variable (government procurement agency size or FTEs) while Table 5 reports the frequencies distribution of these three different operational measures of FTEs.

TABLE 4
Descriptive Statistics for Full-time Equivalent Employees (FTEs)

	$\overline{X}$ (S.E.)	MD	St. Dev.	Range (Min-Max)	Normality	
					Skew (S.E.)	Kurt (S.E.)
Original (N=305)	15.836 (4.074)	4	71.2	1000 (0-1000)	10.572 (.140)	129.954 (.278)
Trichotomous (N=302)	1.6258 (.0477)	1	.829	2.0 (1-3)	.793 (.140)	-1.081 (.280)
Dichotomous (N=302)	1.4868 (.0288)	1	.501	1.0 (1-2)	.053 (.140)	-2.011 (.280)

TABLE 5
Distributions of Two Measures of Full-time Equivalent Employees (FTEs)

Measurement of X	Frequency	Percent	Valid Percent	Cumulative Percent
Trichotomous FTEs				
Small agency	181	53.7%	59.9%	59.9
Medium agency	53	15.7	17.5	77.5
Large agency	68	20.2	22.5	100.0
Total	302	89.6	100.0	
Missing System	35	10.4		
Dichotomous FTEs				
Small agency	155	46.0%	51.3%	51.3
Large agency	147	43.6	48.7	100.0
Total	302	89.6	100.0	
Missing System	35	10.4		

RESULTS

The focus of the analysis centers around the impact that organizational contextual variables might have on the utilization of sustainable criteria in making public procurement decisions. The analysis is predicated on three straightforward hypotheses, and in order to test the first two hypotheses, one-way analyses of variance (ANOVA) were conducted. [8] Finally, a test of the third hypothesis was conducted through crosstabulation analysis.

Recall the coding scheme for the four different levels of government: 1 = Education or Special District; 2 = City/Municipal; 3 = County/Regional; and 4 = State/Provincial. In examining the impact of the government factor on Index 1 (Environmental Criteria Importance), the null hypothesis to be tested is $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$ which reflects the fact that the dependent variable of interest (Y or the mean index value of accounting for environmental criteria) is hypothesized to not depend on level of government. In a similar fashion, the second hypothesis also utilizes one-way ANOVA where the null hypothesis to be tested is $H_0: \mu_1 = \mu_2 = \mu_3$.

Consistent with the first hypothesis, the dependent variable of interest in this second hypothesis (Y or the mean index value of net SPP efforts) is hypothesized to depend on the trichotomous measure of government size. Recall that this is operationalized as small, medium, or large agency. As previously reported, while some kurtosis and skewness across job categories was detected, the ANOVA test has been found to be robust against these specific violations of assumptions (see Glass et al., 1972; also see Donaldson, 1968), especially given that the most robust statistics obtained in SPSS version 23 will be discussed for the purposes of the current study. As a result, the results reported here have adequate power and tend to be robust against any data violations that might inhere.

One-way analysis of variance (ANOVA) measures the variance among the categories of the independent variables or factors (in the first case four levels of government). ANOVA is especially useful when the population variance of public agencies engaged in procurement is unknown as is the case here. A between-subjects design is utilized because different levels of government are observed, and any between-groups variation found exhibits variation attributed to mean

differences between groups in the importance given to utilizing environmental criteria in public purchases.

The larger the observed differences between group means, the larger the variance of group means will be because there are more than two groups. The variance of the group means (computed as mean squares) results from between-groups variation while another source of variation is error attributed to chance (called within-groups variation). An F-statistic is computed that reflects $F_{observed} = \frac{variance\ attributed\ to\ group\ differences}{variance\ attributed\ to\ chance\ or\ error}$ and when the F-ratio = 0, group means are the same, but the larger the F-ratio, the larger the differences between the groups – something that sorting theory tells us is NOT to be expected across levels of government. Moreover, a fixed effect model is utilized for the first two hypotheses.

Hypothesis 1 Results

H_1: Environmental criteria in purchasing does not differ by level of government

Equal variance across the four government levels was indicated based on Levene's test of variance homogeneity, $F(3, 268) = 0.082$, $p = .970$). As a check, both the Welch and Brown-Forsythe tests for robustness were conducted and found to be consistent with failing to reject the null hypothesis at the $p = .05$ level. The one-way analysis of variance (asymptotically F-distributed) showed that commitment to utilizing environmental criteria did NOT depend on the level of government. The Welch robust test results are $F(3, 121.441) = 0.269$, $p < .848$, while the Brown-Forsythe results are $F(3, 211.393) = 0.277$, $p < .842$.

Results strongly suggest that there is no significant difference in accounting for environmental criteria in public purchases based on the level of government, $F(3, 268) = 0.283$, $p = .838$. Both eta-squared (η^2) and omega-squared (ω^2) statistics were calculated to approximate measurements of effect size. Following convention, $\eta^2 = \frac{SS_{BG}}{SS_T}$ and $\omega^2 = \frac{SS_{BG} - df_{BG}(MS_E)}{SS_T + MS_E}$. These calculations yield values of $\eta^2 = 0.003$ and $\omega^2 = 0.000001$, respectively. For both the η^2 and ω^2 results (which are consistent), the data indicate a very small effect of differential commitment to environmental criteria in public purchases

based on the level of government. The results of the one-way ANOVA (Table 6) confirm these findings.

Not reported in the table are Index values ranged from 1 to 20 for City/Municipal and County/Regional while Education/Special District and State/Provincial each had a range of 1 to 19. However, Table 6 reports that while the overall mean for environmental criteria is 9.3529, the 95% confidence intervals for the means reported at the right of the table show substantial overlap across the four levels of government. In addition, the standard errors within each government group do not exhibit alarmingly large differences even though the number of cities and municipalities (N=90) is more than double the number of states (N=39). This strongly suggests that level of government does not seem to be a factor in the extent and consistency in which environmental criteria are taken into account when purchasing rather ordinary products and services. In summary, the scope of what a government does not appear to impact the likelihood that environmental criteria in public purchases will be more important for some governments than others.[9]

TABLE 6
One-Way Analysis of Variance between Commitment to Environmental Criteria and Government Level

Government Level	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Education or Special District	84	9.5000	4.07904	.44506	8.6148	10.3852
City/Municipal	90	9.5111	4.10329	.43252	8.6517	10.3705
County/Regional	59	9.2373	4.35232	.56662	8.1031	10.3715
State/Provincial	39	8.8462	4.33795	.69463	7.4400	10.2524
Total	272	9.3529	4.16811	.25273	8.8554	9.8505
Fixed Effects Model			4.18475	.25374	8.8534	9.8525

Hypothesis 2

H_2: Net efforts toward SPP implementation are not contingent on the size of procurement agencies

Mirroring the ANOVA results for the first hypothesis, data from the ANOVA for the second hypothesis show that the net efforts toward SPP implementation is not contingent on procurement agency size. Equal variance across procurement agency size was indicated based on Levene's test of variance homogeneity, $F(2, 299) = 0.096$, $p = .908$). As a check, both the Welch and Brown-Forsythe tests for robustness were conducted and found to be consistent with failing to reject the null hypothesis at the $p = .05$ level. The one-way analysis of variance (asymptotically F-distributed) showed that the net index value of SPP efforts did NOT depend on the size of the government's procurement agency. The Welch robust test results are $F(2, 116.069) = 0.484$, $p < .618$, while the Brown-Forsythe results are $F(2, 176.193) = 0.486$, $p < .616$.

Results are broadly consistent with a nonsorting conclusion given that $F(2, 299) = 0.488$, $p = .614$. Both eta-squared (η^2) and omega-squared (ω^2) statistics were calculated and showed nearly no effect size ($\eta^2 = 24.31$ and $\omega^2 = 0.003$, respectively). While the value of η^2 can often be interpreted in a similar manner to r^2, η^2 can produce a biased parameter estimate because it is based on the sums of squares of the sample, and the statistics show a wide variation in index values across the sizes of agency, especially comparing medium agencies to the other two agencies (small and large). Thus ω^2 attempts to take this into account and here results indicate that the importance on SPP effort index does not appear to be substantively contingent on agency size, and the one-way ANOVA (Table 7) also confirm these findings in several ways.

For example, while the overall mean is 2.2682, the 95% confidence intervals for the means reported at the right of the table show substantial overlap across the three agency sizes.[10] This is consistent with the nonsorting expectation in an a risk-averse environment. In addition, the table reports 95% confidence intervals for the mean as well as indicating the actual index minima and maxima for each of the three agency sizes (in parentheses). Whereas the data for small agencies ranged from -12 to +17 for this net index, medium agency index values ranged from -7 to +16 and large agencies from -11 to +21. This is interesting because the substantial departure in the index range for medium agencies from their other two brethren do not make a statistical difference in the index means as measured by the F-test and the overlap of confidence intervals,

TABLE 7
One-Way Analysis of Variance for Net Drivers/Barriers Based on
Agency Size

Procurement Agency Size	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean[a]	
					Lower Bound	Upper Bound
Small agency	181	2.2597	4.949	.36786	1.5338 (-12)	2.9855 (+17)
Medium agency	53	1.7736	4.810	.66076	.4477 (-7)	3.0995 (+16)
Large agency	68	2.6765	5.228	.63393	1.4111 (-11)	3.9418 (+21)
Total	302	2.2682	4.981	.28661	1.7042	2.8322
Fixed Effects Model			4.98927	.28710	1.7032	2.8332

Note: [a] Integers in parentheses are minimum and maximum values of
SPP Effort Index.

and subsequent analysis (not reported in the table) confirms lack of statistical significance when conducting two separate t-tests differences between medium agencies and the other two agency sizes.

All of these findings discount the possibility that null results may be partially an artifact of the disparate sample sizes across the three agency sizes which range from 53 in the medium size category to 181 for small agencies. While their associated standard errors reflect these sample size differences, there is little reason to suspect that the findings reported here are anything but what is happening on the ground – that net SPP effort in the public sphere is not different based on agency size and hence there is a lack of sorting that is consistent with the hypothesis.[11] In summary, procurement agency size is not associated with net agency SPP effort in public purchasing decisions.[12]

Hypothesis 3

H[3]: The breadth of TBL coverage is consistent across procurement agency size and level of government.

The third hypothesis is tested with nonparametric crosstabulation statistics where the dependent variable Y is the breadth of commitment to the Triple Bottom Line. Recall the coding scheme for the dependent variable had four different levels of commitment to the TBL: 0 = None; 1 = 1 Aspect of TBL; 2 = 2 Aspects of TBL; and 3 = All 3 Aspects of TBL. In examining the association between procurement agency size on TBL commitment while controlling for the four levels of government, if statistical differences are found, then sorting on this basis is occurring.

Separate bivariate cross-tabulations were run between procurement agency size and TBL (N=302) and between government level and TBL (N=336), and both were found to <u>not</u> be statistically significant at the p = .05 level. However, analysis of the multivariate relationships reported in Table 8 reveal only one statistically significant relationship between procurement agency size and breadth of TBL commitment, and that is for the education/special district government level at the traditional p = .05 level.[13] However, the association is extremely weak. Consider the data reported for the education/special district. It is true that 20.8% of small agencies and just 15.0% of large agencies are committed to only one TBL pillar and at the same time, 40% of large agencies while only 17% of small agencies are committed to all three pillars. This suggests a relationship, but the data for medium agencies shows they are the least likely to commit to only one TBL pillar and also the least likely to commit to all three pillars. Add on top the fact that the data are not monotonic in any way across the pillar commitment and one can see the weak association. Moreover, looking at the column totals show a similar lack of pattern in the data where nearly one-third or 31.5% (N=106) do not pay attention to any pillar of the TBL, 21.7% (N=73) of organizations are only committed to a single pillar; 25.2% (N=85) consider two pillars; and an additional 21.7% (N=73) commit on some level to all three pillars.[14]

In sum, it appears that commitment to the TBL is not associated with the level of government or the size of the procurement agency except in the case of education/special districts and only then is it an extremely weak relationship. The takeaway is that overall, there is strong evidence that the breadth of TBL coverage is consistent across

procurement agency size and level of government – no matter how it is measured.

TABLE 8
Number of TBL Pillars by Government Level and Agency Size

Government / Agency Size	Number of TBL Pillars				Total
	None	1	2	All 3	
Education / Sp. District	(27.3%) (27)	20.2% (20)	29.3% (29)	23.2% (23)	29.5% (99)
Small	34.0 (18)	20.8 (11)	28.3 (15)	17.0 (9)	29.3 (53)
Medium	14.3 (3)	28.6 (6)	42.9 (9)	14.3 (3)	39.6 (21)
Large	20.0 (4)	15.0 (3)	25.0 (5)	40.0 (8)	29.4 (20)
City/Municipal	34.3% (37)	14.8% (16)	21.3% (23)	29.6% (32)	32.1% (108)
Small	32.4 (22)	16.2 (11)	22.1 (15)	29.4 (20)	37.6 (68)
Medium	41.7 (5)	8.3 (1)	8.3 (1)	41.7 (5)	22.6 (12)
Large	35.7 (5)	21.4 (3)	21.4 (3)	21.4 (3)	20.6 (14)
County / Regional	26.4% (19)	23.6% (17)	27.8% (20)	22.2% (16)	21.4% (72)
Small	27.8 (10)	27.8 (10)	33.3 (12)	11.1 (4)	19.9 (36)
Medium	28.6 (2)	28.6 (2)	42.9 (3)	0.0 (0)	13.2 (7)
Large	17.6 (3)	17.6 (3)	17.6 (3)	47.1 (8)	25.0 (17)
State	38.6% (22)	35.1% (20)	22.8% (13)	3.5% (2)	17.0% (57)
Small	37.5 (9)	45.8 (11)	12.5 (3)	4.2 (1)	13.3 (24)
Medium	23.1 (3)	53.8 (7)	23.1 (3)	0.0 (0)	24.5 (13)
Large	47.1 (8)	11.8 (2)	35.3 (6)	5.9 (1)	25.0 (17)
Column Total	31.3% (105)	21.7% (73)	25.3% (85)	21.7% (73)	100% (336)

DISCUSSION

This paper argues that in general, there are many disincentives that stand in the way of promoting change in public procurement practices by government agencies. Because engaging in sustainable purchasing requires some level of entrepreneurialism and risk-taking, examination of this new thrust in public policy is ripe for exploitation, and a sorting framework is adopted to gauge whether some organizations are systematically more likely to pursue sustainable public purchasing (SPP) efforts than others.

It was repeatedly hypothesized that due to the presence of risk aversion, the data on SPP efforts would be more consistent with nonsorting characteristics that would be expected in a risk-averse environment, and the data overwhelmingly concur with this expectation by showing that governments of various scope and reach tend to abstain from aggressively pursuing SPP efforts. Of course, some efforts toward SPP were found, but they tended to be quite variable across and within levels of government and organizational size. What is more, there was a notable lack of uniformity in SPP efforts – something which was consistent with a lack of sorting. Remember: sorting would be expected if particular organizations wanted to stand out or signal that they are aligned with citizen sustainability preferences or if they are concerned with the benefits that might flow from SPP efforts, but the data lead to a very different conclusion that suggests across numerous procurement organizations in the public space, SPP efforts are being adopted in a nearly random fashion.

The data were clear that environmental criteria in purchasing ordinary products and services – one of the least invasive and costly ways to incorporate SPP efforts into spend decisions – does not differ by level of government, and when this criteria is taken into account, the typical dedication across levels of government is one of only partial commitment at best. Moreover, netting out the drivers versus the barriers to instituting SPP efforts was not contingent on the size of procurement agencies. This is noteworthy because if there was sorting based on organizational specialization or professional discretion, the data would show a discernable pattern, but such was not the case. Finally, there was strong evidence that the breadth of TBL coverage is consistent across procurement agency size and level of government – no matter how it is measured. This is important from a sorting perspective because one might hypothesize that larger procurement agencies have a greater ability to engage in more TBL SPP efforts than smaller agencies, or that governments with broader scope are more likely to buy a greater variation in goods and services that might contribute to a larger number of pillars in the TBL. However, again a preponderance of null results was obtained.

Although this is an effort to bridge theory with empirical data, a strong case can be made that the current state of SPP in the United States is the result of random and very cautious experimentation with

little systematic pattern to SPP adoption. As documented in the many endnotes, numerous sensitivity analyses were conducted which exhibited the same hypothesized null results that are consistent with nonsorting. Moreover, the robustness of these findings conveys more confidence that the reported noneffects are not an artifact of measurement or operationalization – all of which improves the validity and generalizability of the findings.

ACKNOWLEDGMENTS

NOTES

1. The level of analysis of the current study is the level of government – not the practitioner. Thus it is assumed that asymmetric information exists between practitioners but the study is agnostic about whether governments will have a variable preference for SPP sorting on the basis of their service scope or organizational characteristics.
2. Although slightly dated, the data used herein are the best available for the purposes of this analysis.
3. The original dataset had nine levels of government, but easy reclassification/recoding reduced this to five levels for ease of analysis.
4. There were many potential ways to assess differences across governments in the extent to which they took environmental criteria into account when purchasing common materials and supplies. For example, it may be that different levels or types of government devote more budgetary spend to some services and products over others. However, this type of data was not available to the authors, and it was unlikely to better illuminate the key research question about SPP sorting. Thus given the type of statistical analysis used herein, the commonalities of the products and services encouraged the creation and utilization of an index across levels of government.
5. Extensive sensitivity tests were conducted on all hypothesis tests with all null results. In addition, LN10 transformations and a two-

step normality transformations were conducted to compare results, yet neither procedure significantly altered the distributions enough to justify transformation since the Kolmogorov-Smirnov and the Shapiro-Wilk tests for normality remained at or very near p=.000. Given the large Ns for these analyses, ANOVA computations were justified.

6. The Education or Special District category includes the original coding "other" throughout the analysis (N=5); the City/Municipal category includes towns, townships, and village throughout the analysis (N=3); and the State/Provincial category includes "Federal agency" throughout the analysis (N=1).

7. The descriptive statistics of the original distribution for full-time equivalent employees (FTEs) reveal substantial nonnormality on both the skewness (Z = 10.572, S_s = .140) and kurtosis (k = 129.954, S_k = .278) measures. However, several unsuccessful attempts were made to transform the original distribution of FTEs for potential use as a continuous normal variable including LN10. As a last attempt, a two-step transformational process involving fractional ranking and then an inverse density functional normalization procedure (setting mean = 0; standard deviation = 1 for the Fractional Ranked FTEs) was used to compute a normalized variable (see Templeton, 2011 for a similar procedure). The problem in this two-step procedural output which produces the variable 'Normalized Fractional Ranked FTEs' is that not only does the variable become nearly uninterpretable, but both the Kolmogorov-Smirnov (p=.000; df=304) and the Shapiro-Wilk (p=.009; df=304) tests for normality suggest that the null hypothesis (H_0: the index is normal) should be rejected. Moreover, while the plots of Normalized Fractional Ranked FTEs were broadly consistent with normality, there still remained at least four concerns over utilizing this transformed variable in the analysis including 1) the proper substantive interpretation of this variable 2) the divergence of the statistical tests from normality 3) the desire to adhere to conservative statistical methods outlined previously and 4) the substantial noncontinuous nature of the original FTE variable. In summary, these four concerns lead to relying upon an ordinal level of measurement of FTEs for subsequent analysis.

8. ANOVA findings relied upon the two most conservative post hoc tests available which included Bonferroni and Hockberg's GT2. In

addition, all pairwise test procedures arrived at nearly the same results with no substantive differences, but the authors typically relied on the Games-Howell statistic due to the presence of unequal sample sizes.

9. Sensitivity analyses were conducted for variable coding of the Y (recoded 0 = Don't Know/Not at all and 1 = Partially/Mostly so that the index value range is 0-10); and for frequency of zero values (where 0 index values were kept in the analysis) to see if the substantive results were altered. Null results were maintained for both analyses which convey more confidence that the reported null effects are not an artifact of measurement or operationalization – all of which improves the validity and generalizability of the findings.

10. A crosstabular analysis was also conducted and exhibited similar null results.

11. Numerous sensitivity analyses were conducted that looked at excluding index values of 0 for the two indexes that went into creating the net index of SPP effort (index of barriers and drivers) and re-running the analyses; and then also excluding values of 0 for the net SPP effort index, yet null results still were found at the p = .05 level.

12. Sensitivity analyses were also conducted for variable coding of the X (recoded 1 = Small Agency, N=155; and 2 = Large Agency, N=147) so that the FTEs becomes a dichotomous variable and the SPP index value range remains -20 to +22); and for frequency of zero and -2 index values (where index values either equal -2 or 0 were deleted from the analysis) to see if the substantive results were altered. Null results were maintained for all of these sensitivity analyses which convey more confidence that the reported null effects are not an artifact of measurement or operationalization – all of which improves the validity and generalizability of the findings.

13. The three respective statistics were all significant at the p = .048 level and include: the value of Somer's d = .184 (SE=.092); Kendall's tau-b = .185 (SE=.093); and Gamma = .276 (SE=.136). Calculation of the insignificant uncertainty coefficient shows that at best there was a proportion reduction in error of 4.6%.

14. To assess whether the crosstabulation results might be sensitive to measurement or coding of the original response categories, a

sensitivity analysis was conducted for variable coding of the agency size so that it became a dichotomous and not a trichotomous variable (FTEs recoded 1 = Small Agency and 2 = Large Agency). Again, null results were maintained.

REFERENCES

ADB (Asian Development Bank). (2011). "The Strategic Importance of Public Procurement." [On-line]. Available at http://adbprocure mentforum.net/wp-content/uploads/SIPPBriefFINAL23Nov2011. pdf. [Retrieved 2-17-14].

Brammer, S., & Walker, H. (2011). "Sustainable Procurement in the Public Sector: An International Comparative Study." *International Journal of Operations & Production Management, 31(4)*: 452-476.

Bratt, C., Hallstedt, S., Robert, K., Broman, G., & Oldmark, J. (2013). "Assessment of Criteria Development for Public Procurement from A Strategic Sustainability Perspective." *Journal of Cleaner Production, 52*: 309-316.

Cohen, J., & Cohen, P. (1975). *Applied Multiple Regression/Correlation Analysis for the Behavioural Sciences*. New York: Erlbaum.

Cramer, J., Hartog, J., Jonker, N., & Van Praag, C. (2002). "Low Risk Aversion Encourages the Choice for Entrepreneurship: An Empirical Test of a Truism." *Journal of Economic Behavior & Organization, 48* (1): 29-36.

de Faro Adamson, D., & Andrew, J. (2007). *The Blue Way*. New York: Simon & Schuster.

Donaldson, T.S. (1968). "Robustness of the F-test to Errors of Both Kinds and the Correlation between the Numerator and Denominator of the F-Ratio." *Journal of the American Statistical Association, 63*: 660-676.

Downs, A. (1967). *Inside Bureaucracy*. Boston, MA: Little, Brown, and Company.

Earnhart, D., & Leonard, J.M. (2016). "Environmental Audits and Signaling: The Role of Firm Organizational Structure *Resource and Energy Economics, 44*: 1-22.

Eurodad (the European Network on Debt and Development). (2009). "Procurement and Development Effectiveness: A Literature Review." [On-line]. Available at http://eurodad.org/uploadedfiles/whats_new/reports/literature_review_procurement_and_development_final.pdf. [Retrieved on 2014, February 13].

Fouarge, D., Kriechel, B., & Dohmen, T. (2015). "Occupational Sorting of School Graduates: The Role of Economic Preferences." *Journal of Economic Behavior & Organization, 106*: 335-351.

Glass, G.V., Peckham, P.D., & Sanders, J.R. (1972). "Consequences of Failure to Meet Assumptions Underlying the Fixed Effects Analyses of Variance and Covariance." *Review of Educational Research, 42* (3): 237-288.

Goswami, A., Meher Diljun, G., & Srivastava, N. (2013). "Engagement with Sustainability Concerns in Public Procurement in India: Why and How." *The Energy and Resources Institute Policy Brief.* (Issue 2013, July 8). New Delhi, India.

Green Jr, K.W., Zelbst, P.J., Meacham, J., & Bhadauria, V.S. (2012). "Green Supply Chain Management Practices: Impact on Performance." *Supply Chain Management: An International Journal*, *17*(3): 290 – 305.

Hope, C., & Fowler, S.J. (2007). "A Critical Review of Sustainable Business Indices and Their Impact." *Journal of Business Ethics*. *76*(3): 243–252.

IISD (International Institute for Sustainable Development). (2007). "State of Play in Sustainable Procurement." Winnipeg, Canada, [On-line]. Available at http://www.iisd.org/pdf/2007/state_procurement.pdf. [Retrieved on February 17, 2014].

Kjöllerström, M. (2008). "Public Procurement as a Tool for Promoting More Sustainable Consumption and Production Patterns." *Sustainable Development Innovation Briefs* (Issue 5, August): 1-12. [On-line]. Available at http://esa.un.org/marrakechprocess/pdf/InnovationBriefs_no5.pdf. [Retrieved on March 7, 2014].

Lehtinen, U. (2012). "Sustainability and Local Food Procurement: A Case Study of Finnish Public Catering." *British Food Journal*, *114*(8): 1053-1071.

Loader, K. (2007). "The Challenge of Competitive Procurement: Value for Money versus Small Business Support." *Public Money & Management,* 27(5), (November): 307-314.

McCue, C., & Prier, E. (2007). "Using Agency Theory to Model Cooperative Public Purchasing." In P. Piga & K. V. Thai (Eds.), *Advancing Public Procurement: Practices, Innovation and Knowledge-Sharing*, 45-70. Boca Raton, FL: PrAcademics Press.

Miemczyk, J., Johnsen, T.E., & Macquet, M. (2012). "Sustainable Purchasing and Supply Management: A Structured Literature Review of Definitions and Measures at the Dyad, Chain and Network Levels." *Supply Chain Management: An International Journal, 17*(5): 478-496.

Morgan, K., & Sonnino, R. (2007). "Empowering Consumers: The Creative Procurement of School Meals in Italy and the UK." *International Journal of Consumer Studies*, *31*(1): 19-25.

Preuss, L. (2009). Addressing Sustainable Development through Public Procurement: The Case of Local Government." *Supply Chain Management: An International Journal*, *14*(3): 213-223.

PricewaterhouseCoopers, Significant and Ecofys (2009). "Collection of Statistical Information on Green Public Procurement in the EU: Report on Data Collection Results." January: 1-108. [On-line]. Available at http://ec.europa.eu/environment/gpp/pdf/statistical _information.pdf. [Retrieved January 28, 2014].

Prier, E., & McCue, C.P. (2014). "Assessing SaaS-Based e-Procurement across Different Levels of Government in the U.S." In L. Valaderas Tavares (Ed.), *New Developments on E-Procurement*: *Proceedings of the Second European Conference on E-Procurement* (pp. 95- 116). [On-line]. Available at http://www.amazon.com/New-Developments-E-Public-Procurement-ebook/dp/B00QWZR0YG. [Retrieved on February 28, 2016].

Prier, E., & McCue, C. P. (2009). "The Implications of a Muddled Definition of Public Procurement." *Journal of Public Procurement, 9*(3&4): 326–370.

Rummel, R. J. (1970). Applied Factor Analysis. Evanston, IL: Northwestern University Press.

Schwerin, E., Prier, E., & McCue, C.P. (2016). "Developing a Sustainability Index for Public Procurement", a paper presented at the 74th Annual Conference of the Midwest Political Science Association, April 7-10, 2016 in Chicago, Illinois.

Schwerin, E., & Prier, E. (2013). "Rent-Seeking and Obstacles to Changing Environmental Practices and Sustainable Public Procurement in China." *Environmental Practice, 15*(3): 240-252

Seghezzo, L. (2009). "The Five Dimensions of Sustainability." *Environmental Politics, 18*(4): 539-556.

Steinfeld, J., McCue, C.P., & Prier, E. (Forthcoming). "Examining Professionalization in Public Procurement by Ranking Practitioner Job Positions According to Job Activities." *International Journal of Procurement Management*.

Swanson, M., Weissman, A., Davis, G., Socolof, M.L., & Davis, K. (2005). "Developing Priorities for Greener State Government Purchasing: A California Case Study." *Journal of Cleaner Production, 13*(7): 669-677.

Tabachnick, B. G., & Fidell, L.S. (2013). *Using Multivariate Statistics* (6th ed.). New York: Pearson.

Templeton, G.F. (2011). "A Two-Step Approach for Transforming Continuous Variables to Normal: Implications and Recommendations for IS Research." *Communications of the Association for Information Systems, 28*(1): 41-58. [On-line]. Available at http://aisel.aisnet.org/cais/vol28/iss1/4 [Retrieved February 28, 2016].

Thomson, J., & Jackson, T. (2007). "Sustainable Procurement in Practice: Lessons from Local Government." *Journal of Environmental Planning and Management*, *50*(3): 421-444.

Tiebout, C. (1956). "A Pure Theory of Local Expenditures." *Journal of Political Economy, 64*(5): 416–424.

Timmons, C., Kuminoff, N., & Smith, K. (2013). "The New Economics of Equilibrium Sorting and Policy Evaluation Using Housing Markets." *Journal of Economic Literature, 51*(4): 1007-1062.

Touboulic, A., & Walker, H. (2015). "Theories in Sustainable Supply Chain Management: A Structured Literature Review."

International Journal of Physical Distribution & Logistics Management, 45(1/2): 16 – 42.

UNDP (United Nations Development Programme). (2010, October). *Public Procurement Capacity Development Guide*. New York, N.Y: Procurement Capacity Development Centre, Capacity Development Group, Bureau for Development Policy. [On-line]. Available at http://www.undp.org/content/dam/aplaws/publication/en/publications/capacity-development/undp-procurement-capacity-assessment-users-guide/Procurement%20Capacity%20Assessment%20Guide.pdf. [Retrieved June 15, 2016].

Vachon, S., & Klassen, R.D. (2007). "Supply Chain Management and Environmental Technologies: The Role of Integration." *International Journal of Production Research*, *45*(2): 795-821.

von Siemens, F.A. (2012). "Social Preferences, Sorting, and Competition: Social Preferences, Sorting, and Competition." *Scandinavian Journal of Economics, 114*(3): 780-807.

Walker, H., & Brammer, S. (2012). "The Relationship between Sustainable Procurement and E-Procurement in the Public Sector." *International Journal of Production Economics, 140*: 256-268.

Walker, H., & Brammer, S., (2009). "Sustainable Procurement in the United Kingdom Public Sector." *Supply Chain Management: An International Journal*, *14*(2): 128-137.

Walker, H., Miemczyk, J., Johnsen, T., & Spencer, R. (2012). "Sustainable Procurement: Past, Present and Future. *Journal of Purchasing and Supply Management*, *18*(4): 201-206.

Walker, H., & Phillips, W. (2009). "Sustainable Procurement: Emerging Issues." *International Journal of Procurement Management, 2(*1): 41-61.

Walker, H., & Preuss, L. (2008). "Fostering Sustainability through Sourcing from Small Business: Public Sector Perspectives." *Journal of Cleaner Production*, *16*: 1600-9.

Warner, K.E., & Ryall, C. (2001). "Greener Purchasing Activities within UK Local Authorities." *Eco-management and Auditing, 8*(1): 36-45.

Winter, M., & Knemeyer, A.M. (2013), "Exploring the integration of sustainability and supply chain management: current state and opportunities for future inquiry", *International Journal of Physical Distribution & Logistics Management, 43*(1): 18-38.

Yale Center for Environmental Law and Policy, Yale University; Center for International Earth Science Information Network, Columbia University; World Economic Forum; & Joint Research Centre, European Commission (2005). *2005 Environmental Sustainability Index* (ESI). Palisades, NY: NASA Socioeconomic Data and Applications Center. [Online]. Available at http://dx.doi.org/ 10.7927/H40V89R6. [Accessed March 25, 2016].