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Capacity to Sustain Sustainability: A Study of U.S. Cities

Why do some governments implement more sustainability practices than others? Based on a national survey of U.S. cities, this article finds moderate levels of sustainability efforts and capacity in U.S. cities; about one-third of the sustainability practices identified in this article have been implemented. The authors conclude that, first, capacity building is a useful conceptual focus for understanding sustainability implementation in U.S. cities. Capacity building involves developing technical and financial support and increasing managerial execution. Second, sustainability is strongly associated with managerial capacity, which includes establishing sustainability goals, incorporating goals in operations, and developing a supportive infrastructure. Third, getting stakeholders involved furthers the capacity for sustaining sustainability efforts. Citizen involvement is strongly associated with securing financial support for sustainability.

Sustainability practices in the U.S. public sector have received scholarly attention for some time (Feiock 2004; Mazmanian and Kraft 2009; Ostrom 1990; Portney 2003). Recently, there have been calls to consider sustainability as a fundamental guiding principle in public management, for example, as a "conceptual focus for public administration" (Fiorino 2010), a "new direction for public administration" (Leuenberger and Bartle 2009), and a "dominant policy paradigm" (Saha and Paterson 2008).

U.S. cities have been at the center of sustainability initiatives for decades, and as such, they have been the subject of multiple studies. Descriptive studies have been conducted to identify various policies, initiatives, techniques, and impediments in sustainability (Jepson 2004; Saha and Paterson 2008). Studies have also explored the factors that influence sustainability, namely, by focusing on a key question posed by Portney (2003): why is it that some cities take sustainability seriously and others don't? Studies have found that local sustainability is tied to local governments' need to deal with environmental pressures and the characteristics of local governance (Betsill and Bulkeley 2006; Feiock and Bae 2011; Feiock, Tavares, and Lubell 2008; Krause 2010; Lubell, Feiock, and Ramirez de la Cruz 2009; O'Connell 2009). Additionally, studies have found contextual influences on sustainability, such as resource availability (Kahn 2006; Lubell, Feiock, and Handy 2009) and socioeconomic and demographic characteristics of the population (Saha 2009).

Recently, however, an emerging literature has started looking into the implementation of sustainability initiatives in government. More specifically, the literature has emphasized the strong role of stakeholder involvement in sustainability (Conroy and Berke 2004; Portney 2005; Portney and Berry 2010; Sharp, Daley, and Lynch 2011). Despite this implementation focus, no study has ever been conducted to understand how the dynamic process of implementation works in local sustainability—that is, whether and how various organizational strategies are adopted to enhance organizational capacity in sustainability implementation. This article examines sustainability implementation and focuses on its dynamic, interactive, and collaborative nature. The following research questions are addressed: What strategies are used by cities to develop organizational capacity for sustainability? Do these strategies improve organizational capacity to implement sustainability practices? Does the capacity enhance sustainability in cities, and if so, in what manner?

This article enriches the literature by providing a capacity-building explanation for sustainability behaviors at the local level. Whereas the previous literature focused on drivers and motives of sustainability, this article emphasizes organizational capacity and incorporates influencing factors that further this capacity. Perhaps more importantly, the results assist public managers in developing strategies that build organizational capacity for a more sustainable community. It should, as Fiorino (2010) urges, facilitate moving the discussion on sustainability forward toward how to best help public sector decision makers with implementation.

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Framework

Capacity Building in Sustainability

Sustainability is defined as a set of practices that address the social, economic, and environmental needs of present and future generations (Adams 2006; WCED 1987). Several components are essential in this definition of sustainability. First, it is important to achieve a balance of social, economic, and environmental goals, which entails developing a strong economy that eliminates poverty, ensuring an acceptable quality of life, and protecting and restoring the natural environment. Second, there is an urgency to protect the natural environment and its ecosystems (Fiorino 2010). While balance is needed, it may not be appropriate to treat the economic and social dimensions as equal to the environmental dimension because the latter represents the setting in which the other dimensions operate, and thus it is not something that can simply be traded off (Adams 2006). Consequently, the call for sustainability has a common thread of emphasizing environmental protection. Third, the emphasis of sustainability inevitably appeals for a longer-term horizon of decision making, measurement of cross-generational impact, and a concern for intergenerational equity and the welfare of future generations (WCED 1987).

In the past decade, scholars have written a significant amount about sustainability at the local level. They have focused on discovering sustainability practices and the motives behind those practices. Slowly, attention has shifted from the description of sustainability practices (what is sustainability?) and motives (why sustainability?) to the formulation of strategies for implementing change (what steps do we need to take?). Today, however, more study is needed to better understand the conditions for implementing change (do we have the conditions that are required for success?) and to manage them (how to execute the desired change with these conditions?). In this context, the term *capacity* is broadly defined as the ability of organizations to carry out their missions and achieve their aims (Honadle 1981; Ingraham, Joyce, and Donahue 2003; Johnson et al. 2004).

In practice, many local governments in the United States have implemented sustainability policies in the face of socioeconomic, political, and environmental challenges (Jepson 2004; Portney 2003; Saha and Paterson 2008). The natural next step is to improve implementation by managing the organizational change that comes with such policies. As Lewin (1951) suggests, successful organizational change essentially involves unlearning current behavior and learning and reinforcing new behavior. In our view, socioeconomic, political, and environmental pressures may motivate an organization to adopt sustainability—an unlearning of old behaviors. Capacity building is a proactive action to learn new behaviors in change implementation and reinforcement.

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The capacity-building approach is based on the idea that there is a required level of institutional capacity for an organization to carry out its responsibilities. Early work on capacity building can be traced to Leavitt (1965), who specified the dependencies between technical, structural, and humanistic approaches for organizational change. Further development is found in studies on organizational effectiveness, in which stakeholder involvement and collaboration, resource and technical capabilities, and human influence (rather than organizational structure and context) are emphasized. Capacity is linked to an organization's ability to establish goals, acquire resources, satisfy customers or citizens, reconfigure internal management processes, and adapt to changes (Daft 1997; Mintzberg, Raisinghani, and Theoret 1976; Pfeffer and Salancik 1978; Wilson 1989). Capacity is also associated with organizational performance (Dollery, Crase, and Grant 2011; Ingraham, Joyce, and Donahue 2003; O'Leary et al. 1999; Rainey 2009) and the adoption of performance measurement (Berman and Wang 2000; Bingham, Nabatchi, and O'Leary 2005). The need for capacity building is recognized in promoting sustainable development at the national level to overcome policy failure in government and the industrial sectors of energy, construction, transportation, and agroindustry (Jänicke 1997; Weidner and Jänicke 2002). Recently, capacity has been linked to local governments' involvement in climate-protecting activities (Krause 2011b). There is strong evidence that organizational capacity is a valid explanation for organizational preferences compared to more proximate political and task environmental approaches in the literature (Whitford 2007).

The capacity-building approach emphasizes the need to systematically develop political support, financial resources, technologies, and managerial execution in building organizational capacity for policy change (Horton et al. 2003). Political capacity is the level of support obtained from stakeholders in implementing sustainability policies and practices. Support from citizens increases the legitimacy and thus the feasibility of actions. Support from managers and employees is critical because they are the implementers of sustainability initiatives, and they can sabotage change through foot dragging and end runs involving citizen advocates and elected officials. Support from elected officials forecloses back channels, legitimates change, and secures funding. Elected officials may be reluctant to give support when they view the change as too politically risky (e.g., they fear being accused of being too liberal for supporting sustainability practices) or when they view the change as a technical matter that should be handled by low-level managers and technicians (e.g., pollution control is primarily a technological concern). Finally, support from the business and nonprofit community is consistent with collaborative planning and collective action efforts that are germane to building social capital and to comprehensively tackling complex issues such as sustainability through the governance of public and private partnerships (Lubell, Leach, and Sabatier, 2009).

Technical capacity refers to an organization's ability to use the technologies required for sustainability. Many sustainability practices involve the use of the latest technologies, for example, in areas such as alternative energy, energy efficiency, pollution control and monitoring, and natural resource management. It is necessary to acquire technical savvy and expertise in sustainability from professional institutions, universities, other research communities, and private consultants. Developing human capital through internal professionalization as well as establishing complementary ties to external technical resources is fundamental for credibility,

for strengthening social norms, and for institutionalizing change (Lubell, Leach, and Sabatier 2009).

Financial capacity is an organization's ability to assemble financial resources to support its operations and missions. Sustainability, by definition, benefits future generations. Many sustainability initiatives (e.g., environmentally sensitive land purchases or renewable energy applications) require large, consistent, and long-term investments. While arbitrarily throwing more resources at any issue is not the solution, spending reductions destabilize sustainability implementation efforts (Vig and Kraft 2006). It is critical to develop and institutionalize funding mechanisms (such as a separate budget line item) and to explore financial resources such as grants, vouchers, loan guarantees, trading permits, and taxes for sustainability (Salamon 2002). It is also important to diversify funding sources to withstand the impact of economic downturns. Furthermore, financial capacity is reflected in the adoption of proper costing methods. Because the benefits of many sustainability initiatives can take a long time to realize, life-cycle costing and cost–benefit analysis tools can help accurately portray the benefits and costs of the initiatives and prompt governments to undertake actions that otherwise might be delayed.

Managerial execution (or capacity) reflects an organization's ability to develop sustainability goals and principles, incorporate those goals and principles into the strategic planning process and operations, and monitor and assess the achievement of those goals. Implementation in sustainability can be smoothed by having permanent institutional arrangements, such as designated individuals or offices in sustainability. Best practices can be learned by establishing, monitoring, and evaluating performance in sustainability. Collaboration among various units can be improved by having an organization-wide sustainability plan (O'Leary et al. 1999).

A Conceptual Model

Two theoretical streams are used to develop the conceptual model of capacity building in this study (see figure 1). The organizational change literature stresses the influence of organizational environments (contextual variables). This literature indicates that within highly uncertain and dynamic environments, high-performing organizations need to continuously engage in a process of learning from their environments and be willing to adjust their actions based on feedback that they obtain from those environments (Daft 1997; Mintzberg, Raisinghani, and Theoret 1976; Pfeffer and Salancik 1978). The organizational effectiveness literature suggests that given the political and socioeconomic environments of a government, a higher level of sustainability is a result of greater organizational capacity, which reflects the successful adoption of various strategies to acquire capacity (Berman and Wang 2000; Ingraham, Joyce, and Donahue 2003; O'Leary et al. 1999; Rainey 2009).

Several sets of factors influence capacity, as shown in figure 1. First, organizational capacity reflects the contextual influence of political propensities, financial condition, environmental pressures, demographic characteristics, and governing structures. Stakeholders' support for sustainability may stem from their political ideologies, as segments of the population have different concerns regarding economic stability and preferences for environmental protection. A summative review of the literature by Konisky, Milyo, and Richardson (2008) concludes that political ideology and partisan affiliation are consistent predictors of citizens' preferences on environmental issues. Stakeholders with politically progressive (liberal) views are more likely to favor sustainability initiatives. Moreover, financial capacity to implement sustainability initiatives may be constrained by the financial condition of a city (Krause 2011a). A healthy financial condition could lead to a larger resource share to support sustainability activities. Furthermore, technical capacity may arise from the environmental pressures of natural environmental deterioration and natural resource depletion, which require technological solutions. Managerial capacity to implement sustainability may be constrained by the governing structure, which determines executive power in implementation and an administration's exposure to external interests (Sharp, Daley, and Lynch 2011).

Also, various capacity variables may influence each other, as suggested by the organizational effectiveness literature (Berman and Wang 2000; Ingraham, Joyce, and Donahue 2003). Citizens' and

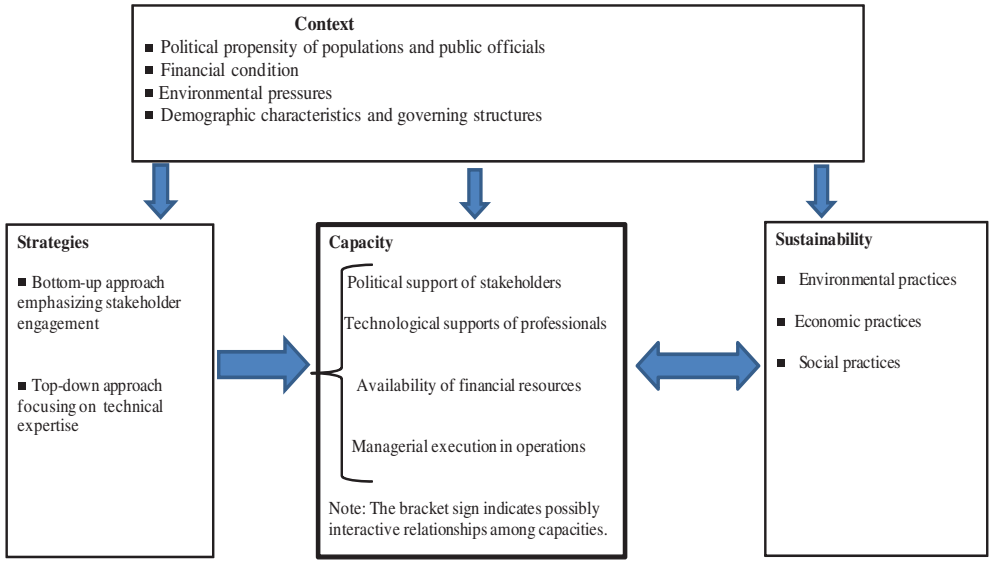

Figure 1 Sustaining Sustainability: A Conceptual Model of Capacity Building

other stakeholders' preferences for sustainability catalyze legislative support, which leads to financial backing of sustainability initiatives. Financial resources make the pursuit of technical capacity possible. Managerial execution is better achieved with reliable legislative support, sufficient resources, and technologies. Positive execution outcomes strengthen stakeholders' support, while negative outcomes reduce the chance of such support.

Nevertheless, perhaps the most influential factor on capacity is the development of proper organizational strategies to acquire the capacity and an understanding of the political and institutional context in which the strategies work (Scott 2003). Realizing the dynamic, interactive, and collaborative nature of policy-making processes, the model stresses efforts to build stakeholder support among citizens, businesses, and other groups outside the government by identifying their motives and meeting their expectations for participation (Bingham, Nabatchi, and O'Leary 2005).

Portney (2005) discusses two distinct strategies for initiating and sustaining sustainability efforts: one centering on assembling stakeholder support and the other emphasizing a top-down approach of acquiring technical expertise from professionals, suggesting that different strategies lead to different implementation results. The top-down approach is based on the idea that many sustainability issues are technical in nature, and thus the acquisition of technical support from experts and professionals, not citizens and other interest groups, is the most effective way to solve them (Portney 2005). On the other hand, the stakeholder strategy emphasizes the importance of involving stakeholders, particularly civic groups, in the planning and implementation of sustainability initiatives, believing that such involvement improves the success rate of implementation by convincing participants of the value of sustainability and that citizens' support is needed to obtain support from elected and agency officials (Conroy and Berke 2004; Portney 2005; Portney and Berry 2010). Moreover, citizens can offer valuable information about local communities and their needs in sustainable development. Gathering this information can ensure that sustainability plans are rooted in a comprehensive understanding of the interactive relationship between human behaviors and the natural environment (Leuenberger and Bartle 2009).

Why are various sustainability strategies adopted? The civic engagement approach requires people who are informed on the issue of environmental protection, which suggests the important role of the socioeconomic backgrounds and political propensities of populations. The urgency to protect the environment because of rapid ecosystem deterioration may provide an additional motive for civic involvement; as Portney states, "the expectation that there is a link between civic engagement and environmental protection seems wholly realistic" (2005, 583). However, many issues in sustainability are highly technical, which may lead governments to pursue a top-down technical approach (Portney 2005). Heightened environmental pressure, such as rampant water and air pollution, may require rapid deployment of technical solutions. A civic engagement approach may be seen as too slow and misguided. Moreover, governing structure may influence the way a city engages stakeholders in sustainability. Sharp, Daley, and Lynch (2011) find that organized interests are more effective in sustainability implementation in mayoral forms of government, suggesting that a bottom-up strategy that involves interest groups may be a preferred choice of implementation in these governments.

It is important to note that capacity building is emphasized in the implementation phase of the policy cycle when there is a gap between organizational capacity and the implementation of an existing policy. Capacity is developed to close the gap and to improve the policy outcome. Nevertheless, capacity building could also result from the adoption of a new policy during the policy formulation stage, when it is decided that additional capacity is needed to carry out the policy. Therefore, the relationship between capacity building and the policy outcome (in this case, sustainability practices) can be reciprocal, reflected as a bidirectional arrow in the conceptual model in figure 1.

Finally, building on previous studies, this article examines five categories of contextual influences on sustainability that manifest as conflict between environmental protection and socioeconomic goals. First, sustainability operates under circumstances that require the constant balancing of conflicting political propensities toward sustainability. Citizens' political attitudes are linked with their governments' sustainability activities (Saha 2009). Second, financial condition may influence sustainability. The level of a government's sustainability activities is limited by the financial slack that it has—what level of resources can be distributed for the goal of sustainability in the face of competition for funding from other socioeconomic goals (Kahn 2006; Lubell, Feiock, and Handy 2009). Third, sustainability practices sometimes are simply a response to the environmental pressures caused by environmental deterioration and natural resource depletion (OECD 1993). Fourth, sustainability can be influenced by the demographic features of populations (e.g., income, education level, and age), as different groups may have different needs and expectations for sustainability (Portney 2003). Fifth, sustainability activities are also associated with governing structures (e.g., forms of government) that frame policy making and implementation (Lubell, Feiock, and Ramirez de la Cruz 2005; Sharp, Daley, and Lynch 2011).

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Method

Data

This study draws on multiple data sources. Data for contextual variables were obtained largely from the U.S. Census Bureau. A survey was developed to obtain data on sustainability practices, strategies, and capacity. A questionnaire was mailed to the chief executive officer or chief administrative officer of all U.S. cities with populations of 50,000 or more in early 2011. Of the 601 cities in the sampling frame, 264 responded to the survey, resulting in a response rate of 44 percent. Of the respondents, 40 percent identified themselves as city managers, chief executive officers, or chief administrative officers; 28 percent were sustainability managers; and 7 percent were planning directors. Other respondents included environmental policy directors, energy and environmental directors, mayors, economic development directors, public works directors, and solid waste directors.

Tests were conducted to determine whether responding cities were significantly different from nonresponding cities on key socioeconomic characteristics. The mean city populations for the responding and nonresponding cities were 176,272 and 156,211, respectively. This difference was not significant ($t = 0.602$, $p = .548$) at the .05 level. The average median household incomes for respondents and nonrespondents were $45,241 and $42,396, respectively. The mean income difference was not significant ($t = 1.961$, $p = .05$) at the .05 level. The council-manager and mayor-council forms of government were present in 66.0 percent and 31.0 percent of responding cities, respectively; that is similar to the 62.0 percent and 35.9 percent, respectively in U.S. cities with populations of 50,000 or more (ICMA 2010).

Measuring Sustainability

Measuring sustainability is challenging because of the evolving nature of the concept. However, a general consensus has emerged in the literature that sustainability consists of integrating and balancing three key dimensions: environmental, economic, and social sustainability (Adams 2006). The development of the sustainability measurement in this study took into account the existing literature and a validity enhancement of the measurement. A sustainability index was developed to assess a government's level of practices to lead, coordinate, design, and implement actions in environmental, economic, and social sustainability. The study relies on two measurement models to develop and categorize specific measures of the index. First, a classification scheme developed by the Florida Green Building Coalition (FGBC) is used to measure environmental sustainability. The FGBC identified a comprehensive list of more than 300 sustainability practices from 19 city functions and weighted the impact of the practices.[1] Because of space limitations, this survey includes only the 17 environmental sustainability items that were weighted highest on the FGBC list (FGBC 2009). The items are listed in table 1 under "Environmental Sustainability Practices."

Second, the measurement considers the classification of local policies used by Saha and Paterson (2008), who conducted a comprehensive review of previous studies on sustainability. In this classification, environmentally friendly economic development initiatives in energy and resource efficiency are given an important role. The 23 economic sustainability measures in this study focus on the need to maintain economic competitiveness while using less energy and fewer resources. These measures reflect the general emphasis on local quality of life and on the local government's strategic investments in businesses and economic development programs that focus on technology and entrepreneurship, minimize energy use, and help accomplish goals of resource protection. The measures are listed in table 1 under "Economic Sustainability Practices."

It is recognized in the literature that social sustainability is the least developed of the three dimensions of sustainability (Partridge 2005). The notion of social sustainability in this study centers on the equitable distribution and utilization of resources among social groups in sustainability development, an idea suggested by Mazmanian and Kraft (2009) and Saha and Paterson (2008). Sustainability efforts in providing affordable housing, developing affordable means of transportation, and providing affordable life necessities (such as water and food) are used. Eleven measures of social sustainability practices are listed under "Social Sustainability Practices" in table 1.

Fifty-one survey items were used to construct a three-dimensional sustainability index (SI). Many sustainability measures identified in previous studies are included here (Jepson 2004; Krause 2011a; Portney 2003; Saha and Paterson 2008), although this index places a stronger focus on energy efficiency, pollution control, and green economic development measures. Less emphasized are traditional smart growth measures and recycling programs. Efforts were made to strengthen the measurement validity of the sustainability index and other indices in the study.[2] Despite these efforts, the survey items by no means cover all sustainability practices in city government; however, it is hoped that they represent important dimensions of sustainability efforts.

Measuring Capacity

Capacity is defined as an organization's ability to carry out its mission (Berman and Wang 2000; Ingraham, Joyce, and Donahue 2003; Jänicke 1997; Johnson et al. 2004). In developing measures of capacity, this study adopts a classification used by the International Development Research Centre of Canada (Horton et al. 2003) that distinguishes between tangible capacity ("hard" capacity, or financial resources and technologies) and intangible capacity ("soft" capacity, or managerial skills and political support). Political capacity is measured by the level of support from various stakeholders in policy implementation, a measurement focus that is used in multiple studies (Berman and Wang 2000; Horton et al. 2003; Ingraham, Joyce, and Donahue, 2003). The measurement consists of support from all key stakeholders in city government, including elected officials, managers, citizens, businesses, and nonprofits. Ten key stakeholder groups are identified, and the specific items measuring their support for sustainability are listed in table 2.

Measurement of other capacities in this study is guided by the capacity-building literature and by a conceptual framework used at the 2009 Copenhagen global climate summit. The Copenhagen framework assesses progress toward climate goals by examining organizational capacity in climate goal development, financing, technology use, and cooperation (Levi 2009). Ten items are used to measure managerial capacity, which reflects an administration's ability to develop, implement, monitor, and assess sustainability goals and initiatives. Financial capacity is measured by seven items concerning the ability to obtain and maintain financial resources for sustainability. Technical capacity is measured by items indicating the level of technical support from experts and professional organizations. A total of 32 capacity items are listed in table 2.

Measuring Strategies and Context

In developing the measurement of strategies (table 3), this study distinguishes between bottom-up strategies, which emphasize stakeholder engagement, and top-down strategies for acquiring technical expertise. Because of the obvious merits of civic engagement identified in the literature (Conroy and Berke 2004; Portney 2005; Portney and Berry 2010), this study also measures citizen engagement strategies, distinguishing between citizen involvement strategies and strategies for involving other stakeholders. A total of 21 items are used to measure strategies (table 3).

In terms of measuring contextual impact, measures of political attitudes include a city's percentage of votes for the Democratic presidential candidate in 2008 and two survey items on the political

Table 1 Sustainability in U.S. Cities

Environmental Sustainability Practices	Action Taken %	Correlation with SI[1]
Implemented a program that systematically conserves or plants trees	78.0%	0.30**
Purchased alternative fuel vehicles for city business	77.7%	0.35**
Become a member of a sustainability group (e.g., US Green Building Council)	61.1%	0.52**
Constructed new building based on LEED standards	59.5%	0.43**
Operated a website dedicated to green city programs	53.4%	0.49**
Used renewable energy (solar, wind, geothermal heat, etc.) in city departments' operations	51.9%	0.48**
Purchased and protected environmentally sensitive lands	49.6%	0.39**
Adopted green cleaning and maintenance procedures	44.7%	0.44**
Offered energy audits to citizens, business, and community stakeholders	36.7%	0.38**
Adopted a green standard as official minimum criteria for new government buildings	35.6%	0.55**
Offered green technology education classes or workshops to the community	34.1%	0.51**
Developed an environmentally preferable purchasing program	31.8%	0.50**
Utilized LEED or Commercial Interiors (CI) specifications to renovate existing buildings	29.9%	0.44**
Offered green technology education classes or workshops to employees	29.9%	0.53**
Posted air quality index or/and water quality testing results on city website	29.5%	0.32**
Adopted green landscaping ordinance for local government buildings	24.2%	0.34**
Offered renewable energy (solar, wind, geothermal heat, etc.) to citizens or customers	18.6%	0.44**
Environmental Sustainability Average Measure	43.9%	0.91**
Scale Statistics: Alpha: 0.795, Mean: 0.439, Std.Dev: 0.172		
Economic Sustainability Practices		
Implemented "Buy Local" campaigns	49.6%	0.28**
Built partnerships with the business community to achieve sustainability goals	49.2%	0.62**
Linked environmental goals to publicly financed incentive packages	28.0%	0.49**
Established a brownfields redevelopment fund	27.7%	0.26**
Created demand for green products through public procurement policies	25.4%	0.51**
Zoning or regulations that allow for onsite renewable energy systems for businesses	25.4%	0.36**
Residential green building checklist	23.5%	0.52**
Developed policies to create and strengthen markets for green goods and services	23.1%	0.55**
Provide low-interest loans for energy efficiency measures and building materials	22.7%	0.38**
Built capacity to "green" existing business processes	20.5%	0.60**
Provided a green-collar workforce training assistance	17.8%	0.47**
Priority permitting and fee waivers for installation of green technologies	16.3%	0.37**
Publicly committed to a green-collar jobs strategy	15.9%	0.49**
Designated locations for alternative energy generation, R&D, or manufacturing	15.5%	0.39**
Promoted greening location decisions	14.0%	0.37**
Created a Green Economic Development Plan document	13.3%	0.35**
Incentives that lower financial barriers to energy efficiency gains by businesses	13.3%	0.47**
Density bonus for buildings achieving LEED certification	10.6%	0.29**
Identified green-collar goals and assessed existing local opportunities	10.2%	0.46**
Fee reductions to cover the cost of LEED certification	7.6%	0.30**
Expedited application and permit process for alternative energy facilities	7.6%	0.26**
Created a green-collar jobs taskforce	6.1%	0.30**
Property tax credit to any commercial building that achieves LEED certification	4.6%	0.14*
Economic Sustainability Average Measure	19.5%	0.90**
Scale Statistics: Alpha: 0.825, Mean: 0.195, Std.Dev: 0.115		
Social Sustainability Practices		
Promoted and accommodated bicycle use (e.g., bike lanes)	84.9%	0.31**
Monitored water quality	81.1%	0.29**
Promoted and educated the public on water conservation	79.9%	0.30**
Installed appropriate bicycle security at public amenities	50.4%	0.42**
Arranged carpool/vanpool assistance	41.7%	0.48**
Maintained an on-call water quality program	36.7%	0.46**
Maintained organic community gardens	36.4%	0.41**
Offered education on organic farming	22.7%	0.43**
Offered incentives for location efficient affordable housing	20.5%	0.37**
Offered orientation classes for residents of affordable housing	20.1%	0.27**
Offered incentives for construction of green affordable housing	18.6%	0.51**
Social Sustainability Average Measure	44.8%	0.79**
Scale Statistics: Alpha: 0.681, Mean: 0.448, Std.Dev: 0.247		

[1]Shown are Pearson Correlation Coefficients. * Significant at the 0.05 level; ** Significant at the 0.01 level.

propensities ("politically liberal or progressive") of city residents or elected officials. Variables measuring financial condition consist of multiple survey items on revenue shortage, revenue decline, financial reserve, and employment loss. The variables measuring environmental pressures include census data for population size and growth, population density, percentage of urban population, land size, income, and manufacturing industry size. The demographics variables consist of census data for poverty rate, resident median age, residents' educational level and household income, and white and black shares of the population. In addition, the form of government

Table 2 Capacity for Sustainability

Political Support: "Our sustainability efforts have support from..."	**Action Taken %**	**Correlation with SI[1]**
Most department heads in the city	86.7%	0.30**
The Mayor's office	86.4%	0.25**
Most managers in the city	67.4%	0.40**
Agencies in other governments	56.4%	0.44**
Most supervisors in the city	54.6%	0.29**
Most legislators in the city	53.4%	0.34**
Local business leaders of the city	50.4%	0.51**
Most employees in the city	49.6%	0.30**
Most citizens of the city	43.9%	0.38**
Nonprofits or other stakeholders	15.9%	0.22**
Political Capacity Average Measure	56.5%	0.53**
Scale Statistics: Alpha: 0.854, Mean: 0.565, Std.Dev: 0.196		
Technical Support: "Our sustainability efforts have support from..."		
City staff capable of using the green technology	58.0%	0.29**
Professional institutions of green initiatives such as USGBC and ICLEI	53.8%	0.53**
Universities or research communities specialized in green technologies or strategies	50.8%	0.41**
Private consultants specialized in green technologies or strategies	50.0%	0.36**
Technical Capacity Average Measure	53.1%	0.56**
Scale Statistics: Alpha: 0.616, Mean: 0.531, Std.Dev: 0.031		
Financial Resources: "Our city has..."		
Applied grants to finance sustainability initiatives	71.2%	0.29**
Funded capital projects related to sustainability initiatives	50.4%	0.44**
Budgeted for the city government's sustainability initiatives	43.6%	0.52**
Maintained the funding level for the city's sustainability activities	25.8%	0.44**
Issued debts to finance sustainability initiatives	11.4%	0.26**
Offered tax (or financial) incentives for the residential or commercial use of carbon-reducing technologies	8.3%	0.32**
Offered tax (or financial) incentives for developing or redeveloping green properties	6.4%	0.34**
Financial Capacity Average Measure	31.0%	0.65**
Scale Statistics: Alpha: 0.672, Mean: 0.310, Std.Dev: 0.229		
Managerial Execution: "Our city has..."		
Incorporated sustainability principles in city departments' operations	56.1%	0.48**
Incorporated sustainability principles into city government's comprehensive plan	53.4%	0.37**
Incorporated sustainability principles into city government's strategic plan	45.5%	0.46**
Included commitments for sustainability in the city's goal or mission statement	42.1%	0.44**
Convened city-wide meetings to discuss commitments for sustainability for past 12 months	41.3%	0.40**
Monitored and tracked the performances of city's sustainability initiatives	38.3%	0.53**
Designated an office to coordinate city's sustainability initiatives	37.9%	0.50**
Developed a city-wide sustainability plan	35.6%	0.36**
Developed performance measures to evaluate city's sustainability initiatives	34.5%	0.51**
Evaluated the performances of city's sustainability initiatives	26.9%	0.51**
Improved performances of city's sustainability initiatives based on performance evaluation	16.7%	0.50**
Management Capacity (Execution) Average Measure	38.9%	0.71**
Scale Statistics: Alpha: 0.856, Mean: 0.389 Std.Dev: 0.106		

[1]Shown are Pearson Correlation Coefficients. * Significant at the .05 level;**Significant at the 0.01 level.

is included as a measure of governing structures. Geographic locations (cities located in the West Coast or not) are also included. A total of 27 contextual variables are included in this study.

Findings

How Much Sustainability?

Table 1 presents the items that make up the sustainability index and descriptive statistics. Respondents were asked to identify actions that their cities have taken to implement sustainability practices. All cities in the sample have implemented at least one practice: 99.2 percent have implemented at least one environmental sustainability practice, 91.7 percent have at least one economic sustainability practice, and 96.6 percent have at least one social sustainability practice. On average, cities have implemented approximately one-third (33.1 percent) of the practices—a moderate level of implementation. They have implemented 43.9 percent of the environmental sustainability practices, 19.5 percent of the economic sustainability practices, and 44.8 percent of the social sustainability practices.

Some of the most popular sustainability practices in cities include tree conservation (78.0 percent), alternative fuel vehicle adoption (77.7 percent), promotion of bicycle use (84.9 percent), and water conservation education (79.9 percent). One popular and important practice is the construction of new buildings with LEED (Leadership in Energy and Environmental Design) standards (59.5 percent). Buildings account for 39 percent of total energy consumption and 68 percent of electricity consumption (Nelson 2004). Building assessment systems such as LEED provide standardized information for local officials to measure the sustainability of buildings and are commonly used to rate, rank, or assess how buildings address environmental concerns (Retzlaff 2008). Buildings recognized as meeting sustainability goals based on such an assessment system allow communities to promote and market the building's

Table 3 Strategies to Improve Capacity

Acquiring Technical Expertise: "Our city has..."	**Action Taken %**	**Correlation with Capacity[1]**
Actively sought best practices information from other governments	64.8%	0.55**
Developed the technical expertise of our own staff in sustainability efforts	55.7%	0.53**
Actively sought technical expertise of professional organizations such as USGBC or ICLEI	50.4%	0.57**
Actively sought technical expertise of consulting firms	50.0%	0.59**
Actively sought technical expertise of universities and research institutions	37.5%	0.45**
Technical Strategy Average Measure	51.7%	0.70**
Scale Statistics: Alpha: 0.792, Mean: 0.517, Std.Dev: 0.089		
Engaging Citizens: "To engage citizens in sustainability, our city has..."		
Used information provision activities (e.g., newspaper articles, web-based announcements)	62.5%	0.50**
Used citizen boards and commissions	52.7%	0.54**
Focused on getting citizens' support in our sustainability efforts	50.4%	0.49**
Used local neighborhood organizations	40.5%	0.43**
Used chambers of commerce	38.3%	0.45**
Frequently explained the results of sustainability efforts to citizens	37.1%	0.53**
Used community visioning workshops	34.9%	0.39**
Used citizen surveys	33.0%	0.32**
Used consensus building workshops	19.7%	0.33**
Used other citizen initiatives	9.5%	0.28**
Used conflict resolution techniques and mediation roundtable discussions	2.3%	0.27**
Citizen Engagement Strategy Average Measure	34.6%	0.72**
Scale Statistics: Alpha: 0.799, Mean: 0.346, Std.Dev: 0.173		
Involving non-Citizen Stakeholders: "Our city has..."		
Involved city management in crafting a sustainable version of the city	57.6%	0.55**
Involved city employees in crafting a sustainable version of the city	51.5%	0.57**
Involved city legislators in crafting a sustainable version of the city	40.2%	0.51**
Involved business groups in developing a sustainable version of the city	34.5%	0.55**
Involve nonprofits or other stakeholders in crafting a sustainable version of the city	9.1%	0.32**
Non-Citizen Stakeholder Strategy Average Measure	38.6%	0.69**
Scale Statistics: Alpha: 0.785, Mean: 0.386, Std.Dev: 0.168		

[1]Shown are Pearson Correlation Coefficients with a capacity variable that consists of all capacity items (see Table 2).
*Significant at the .05 level; **Significant at the 0.01 level.

energy efficiency, water conservation, site selection, materials, waste management, and indoor environmental quality (USGBC 2007). Another important practice is the use of renewable energy in city operations (51.9 percent). There are more than 19,000 municipalities in the United States, and they provide services to the largest concentration of population (U.S. Census Bureau 2007). Renewable energy use in the operations of these services should have a positive impact on the environment.

Nevertheless, this study finds a level of sustainability activity lower than that shown in Saha and Paterson's study (2008). In that earlier study, 56 percent of the cities had adopted "energy conservation efforts (other than green building programs)." Most of the energy conservation efforts identified in this study have been implemented by less than 50 percent of the cities. Saha and Paterson showed that 73 percent of cities had adopted "environmentally sensitive area protection," while only 49.6 percent of cities in this study have "purchased and protected environmentally sensitive lands." In the Saha and Paterson study, 65 percent of cities had adopted "brownfield reclamation," while in this study, only 27.7 percent of cities have "established a brownfields redevelopment fund."

Individual sustainability measures and SI are highly associated (see table 1)—a prerequisite for constructing a valid and reliable SI. Cronbach's alpha is .902 for the SI, indicating a high level of measurement reliability of the index. Cronbach's alphas are .795, .825, and .681, respectively, for the three-dimensional sustainability indices.

How Much Capacity and What Strategies?

The organizational capacity to implement sustainability is examined. On average, cities have deployed 44.4 percent of the 32 capacity items identified in this study (table 2). They have developed more political (56.5 percent) and technical (53.1) capacities and fewer financial (31.0 percent) and managerial (38.9 percent) capacities. Managerial capacity (an index measure consisting of all managerial capacity items) is most highly associated with SI (r = .71), followed by financial capacity (r = .65), technical capacity (r = .56), and political capacity (r = .53)

High in score on the managerial capacity index is the incorporation of sustainability principles into cities' comprehensive plans (53.4 percent), departments' operations (56.1 percent), and strategic plans (45.5 percent). Low in score on the index are performance evaluation of sustainability practices (26.9 percent) and performance improvement based on the evaluation (16.7 percent). These findings suggest that the managerial capacity for sustainability in cities is more in the phase of development and implementation than in evaluation and improvement.

More than 70 percent of the cities have applied for grants to finance their sustainability practices. However, less than half of the cities have set aside funds in their budgets for sustainability initiatives, and only a fourth have maintained the funding level for sustainability. Moreover, very few cities provide tax incentives for green technology use (8.3 percent) and green property development (6.4 percent). These findings indicate a level of uncertainty and instability in developing financial capacity for sustainability, perhaps

reflecting the stressful financial conditions facing many local governments during the study period.

In terms of political capacity, there is a high degree of support for sustainability at the executive level (department heads, mayors, and managers), but support is considerably weaker among lower-level employees, citizens, businesses, and other stakeholders. From the perspective of building technical capacity, the majority of the cities indicated that there is support for their sustainability efforts from universities, professional associations, private consultants, and their own technical staff. Correlation analysis shows significant relationships between most capacity items and SI. Cronbach's alphas indicate relatively high reliabilities for capacity indices.

There is a high degree of support for sustainability at the executive level (department heads, mayors, and managers), but support is considerably weaker among lower-level employees, citizens, businesses, and other stakeholders.

Table 3 shows the extent of the use of the top-down (i.e., technically driven) and bottom-up (i.e., stakeholder driven) approaches in sustainability. Both types of strategies are used in the cities, although the technical strategies are more popular. On average, 51.7 percent reported their use. All technical strategies are pursued by 50 percent or more of the cities, with the exception of seeking technical expertise from universities and research institutions (pursued by 37.5 percent). The most frequently used citizen engagement strategies are information provision activities (62.5 percent) and citizen boards and commissions (52.7 percent). Significantly less used are community visioning workshops (34.9 percent), citizen surveys (33.0 percent), and conflict resolution roundtables (2.3 percent).

The results show that cities have been internally focused on getting support from management and employees. There is still considerable room for garnering support from legislators, the business community, and other stakeholders, including nonprofits.

This study also examines the strategies used to obtain support from noncitizen political stakeholders. The results show that cities have been internally focused on getting support from management and employees. There is still considerable room for garnering support from legislators, the business community, and other stakeholders, including nonprofits.

Correlations show significant relationships between all three strategy indices and a capacity variable that includes all capacity items. Despite the potential effectiveness of all three strategies in improving the organizational capacity for sustainability, cities tend to rely more on a top-down and internal approach that emphasizes obtaining professional and technical support from experts, managers, and employees.

Modeling the Capacity Building of Sustainability

This study utilizes structural equation modeling to examine the relationships depicted in figure 1. Structural equation modeling is useful for evaluating hypothesized relationships among different constructs. It compares the relative strengths of direct and indirect relationships among variables through a path analysis. In our study, a summative index is used for each strategy, capacity, and sustainability variable (see tables 2 and 3 for alpha

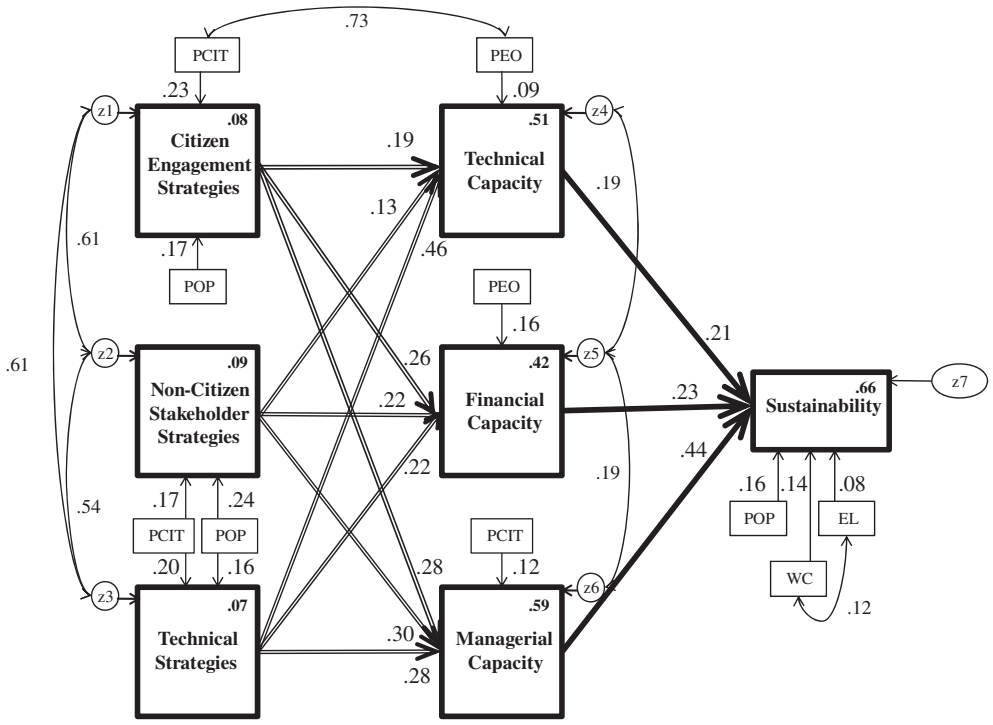

Figure 2 Structural Equation Model for Capacity Building of Local Sustainability

coefficients). An initial, preliminary model is examined. First, while three of the four capacity variables (technical, financial and managerial capacity) are significantly associated with sustainability practices (SI), political capacity is not associated with SI. Also, an examination of bidirectional relationships shows influences from the three capacity-building variables to sustainability, but not vice versa; testing the impact of sustainability on capacity shows insignificant relations and misspecified models. Adopting more sustainability practices may not increase capacity. Second, relationships among capacity variables are also examined, but no such significant relationships are found. The impacts of capacity variables on sustainability appear to occur directly, not through other capacity variables. The interactive effect of capacity variables is limited in the implementation stage of sustainability.

Third, relationships between the three strategy and three capacity variables are also examined. The initial model explains a significant portion of the variances in the capacity variables, about 40 percent to 50 percent, which is largely attributable to the three strategies rather than contextual variables. We also examined a broad range of contextual variables, of which five variables are significantly associated with key study variables: progressive citizenry and elected officials, population size, region (West Coast), and employment loss. Based on this, a final model (figure 2) is developed with acceptable fit using customary measures. The χ^2 statistic is insignificant (χ^2 = 43.8, *df* = 35, *p* = .145), indicating no significant differences between the hypothesized model and the data at the .05 level. Other measures also show good fit (CMIN/DF = 1.3, CFI = 0.99, RMSEA = 0.031). The upper limit of the 90 percent confidence interval for RMSEA is 0.057. All relationships in figure 2 are statistically significant at the .05 level. Though the final model is a bit involved, some complexity is inherent in the nature of implementation.

We find the following three results. First, the sustainability implementation index is explained reasonably well by the hypothesized model. In all, 66 percent of the variance in SI (R^2 = .66) is explained by variables affecting it (all of which have a statistically significant relationship with SI, $p < .05$), and the model explains about half of the variance in the mediating variables of managerial capacity (R^2 = .59), technical capacity (R^2 = .51), and financial capacity (R^2 = .42). These results confirm the usefulness of the capacity-building model in assessing the implementation of sustainability practices. With the possibility that more and more public organizations are moving toward implementing sustainability initiatives as a result of socioeconomic and environmental pressures, this finding indicates the value of the model in future studies of sustainability implementation.

Second, although all of the three capacity variables are significantly associated with sustainability, the largest association comes from managerial capacity (β = .44), which is significantly higher than those from financial capacity (β =.23) and technical capacity (β =.21). Further analysis shows that the managerial capacity index (including all items measuring managerial capacity) is significantly associated with environmental, economic, and social sustainability indices (*r* = .668, .600, and .552, respectively) at the .01 level. Cities with below-average managerial capacity (i.e., having a managerial capacity index score below the mean of 38.9 percent) implement an average of 23.6 percent of sustainability initiatives identified in this study. Cities with an equal or above-average managerial capacity implement an average of 42.4 percent.

These findings suggest a significant role for public managers in sustainability implementation. In order for sustainability initiatives to be successful, an organization needs to have managers who are actively engaged in developing goals, facilitating operations, tracking results, and assessing outcomes in sustainability. The role of managerial capacity is particularly salient in light of the finding that managerial capacity is less prevalent (38.9 percent) than technical support (53.1 percent) or political support (56.5 percent), suggesting great potential for improvement. Strengthening managerial execution could effectively enhance sustainability in U.S. local governments.

Third, the results provide evidence that stakeholder engagement can be an effective strategy for increasing capacity. Although the relationships between stakeholder engagement and sustainability are indirect, the sum of all indirect relationships involving citizens and noncitizens is large (β =.43) and about equal to the direct relationship between managerial capacity and sustainability (β =.44). The sum of these engagement relationships is also considerably higher than the sum of indirect relationships between technical strategies and sustainability (β =.27). In addition, although implementing sustainability involves many technical issues and solutions, and getting technical expertise is important (β =.28), our findings show that engaging citizens (β =.28) and noncitizen stakeholders (β =.30) can be equally consequential to strengthening managerial capacity. Engagement may help managers gather information needed for developing sustainability plans and incorporating sustainability principles in operations. Moreover, although acquiring technical expertise appears to be most effective at increasing technical capacity (β =.46), citizen engagement strategies have the strongest relationship with leveraging financial resources for sustainability (β =.26). In short, these findings show that (1) both stakeholder involvement and managerial execution may be the most important determinants of sustainability implementation efforts in U.S. cities, and (2) the effect of stakeholder engagement on sustainability appears to be indirect. The latter finding is additionally supported by the absence of any direct effect of political capacity on SI, mentioned earlier. Many sustainability efforts may begin with stakeholders seeking buy-in and setting agendas, but that alone is insufficient to ensure implementation.

Finally, the five contextual variables with significant relationships are citizens with political progressive propensities (PCIT), elected officials with political progressive propensities (PEO), 2009 population (logged) (POP), location on the West Coast (California, Oregon, or Washington) (WC), and three-year employment loss (EL). However, while large cities with citizens of politically progressive views tend to adopt more sustainability strategies, the relatively small amount of variance explained for the strategies (all three R^2 less than .10) suggests that other factors likely also affect these sustainability strategies. The positive relationship between sustainability and the employment loss, though marginal (.08), reflects that, during the study period, many states with high unemployment received large amounts of stimulus dollars that were dedicated for sustainability efforts (ECOS 2010).

Conclusion

Cities have implemented about a third (33.1 percent) of sustainability initiatives identified in this study, reflecting a moderate level of implementation, with more practices in environmental and social sustainability and fewer in economic sustainability. Cities have already garnered a moderate level of organizational capacity (44.4 percent) in implementing sustainability initiatives. To many cities, sustainability is not merely a spontaneous and tentative reaction to political, social, environmental, and demographic pressures. They have been actively engaged in developing organizational capacity in sustainability. Nevertheless, a relatively low level of financial capacity and managerial capacity exists. Cities tend to rely more on top-down and internal strategies that emphasize obtaining professional and technical support from experts, managers, and employees. Less used are strategies that actively engage citizens, legislators, businesses, and other groups in sustainability.

To many cities, sustainability is not merely a spontaneous and tentative reaction to political, social, environmental, and demographic pressures. They have been actively engaged in developing organizational capacity in sustainability.

There are three key findings from the capacity-building model. First, the results confirm the usefulness of the model in explaining behaviors in implementing sustainability in cities and strengthen the argument for selecting this approach in studies of sustainability implementation. The model explains a significant portion of variation in sustainability, suggesting that cities' sustainability practices are driven by efforts to develop organizational capacity in management, finance, and technical expertise.

Second, a highly salient finding is the emergence of managerial capacity, which indicates a prominent role of managerial execution in furthering sustainability initiatives. To sustain sustainability, public managers should take the lead in developing sustainability goals and incorporating those goals into management and operations. They can develop a supportive infrastructure for planning, staffing, monitoring, and evaluation and be actively engaged in acquiring financial resources and technical expertise to support the implementation of sustainability initiatives.

Third, there is evidence demonstrating the effectiveness of stakeholder involvement in sustainability. Although the technical complexity of many sustainability practices requires the involvement of professional staff and institutions, equally important is engaging other stakeholders in furthering sustainability. The involvement of legislators, managers, and employees can be similarly effective in increasing sustainability through enhanced capacity. In a research agenda for sustainability, Portney (2005) calls for evidence to show the outcome of civic engagement in sustainability. This study shows that getting citizens involved is highly associated with obtaining financial resources for sustainability initiatives. Such engagement may help cities assemble the financial support needed to initiate and sustain sustainability efforts.

This study has several limitations. First, the sample is from cities with populations for 50,000 or more. Caution is needed to generalize the results to smaller cities, which may have less capacity in sustainability implementation. Samples from other jurisdictions (e.g., counties, states) should also be included in future research. Case studies of selected jurisdictions or sustainability programs can strengthen our understanding of the process of capacity building. Second, the sustainability index was constructed to be comprehensive, yet some important local sustainability practices are excluded, such as practices in environmental justice and equity, which concern various populations affected by man-made environmental risks (e.g., pollutions) and those groups' equitable access to public environmental goods in health and well-being. These practices are not included in the FGBC measurement model, and so they are absent in SI. Future studies should consider including measurement of these practices. Also excluded in the measurement are sustainability practices in functions that are applicable only to certain city governments, such as agriculture, ports, and marines. Because not all cities in the sample possess these functions, including sustainability practices in these functions would have resulted in biased responses in constructing the index.

Third, this study focuses on sustainability implementation, not outcomes. Studies that link the capacity-building model with sustainability outcomes—particularly objective outcome measures in pollution abatement, carbon dioxide reduction, energy efficiency, increased economic activities, and monetary saving—can help refine the model and further sustainability implementation. Finally, this study relies on public managers' knowledge (and judgment) in measurement of sustainability. There could be a difference between this measurement and objective measures of sustainability. The findings of this study should be viewed with this caveat before objective measures of sustainability implementation are developed (if ever).

Notes

1. The FGBC identified municipal sustainability practices from a comprehensive range of 19 city functions (i.e., public safety, transportation, general government, public works, parks and recreation, etc.) in areas of energy, air, water, waste, health, land use, and sustainability awareness. Based on these city functions, the FGBC developed a comprehensive list of more than 300 items weighted by their relative significance to the sustainability measurement scheme.
2. The survey instrument was pre-tested on a group of about 15 local public managers, and changes were made from their feedback. Survey items concern policies, practices, and assessments of respondents about which they are likely to be familiar as a result of their job interactions. Virtually all (97.3 percent) of respondents of the survey indicated that they were very familiar or familiar with their cities' sustainability activities. A large majority of respondents (95 percent) hold executive or managerial positions—an indication of strong knowledge of the citywide sustainability practices measured in this study. Response bias was examined by comparing the responses of four different job categories. While a few differences exist, they are relatively minor and do not significantly affect our results.

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