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IMPLEMENTING SUSTAINABILITY INITIATIVES:
A STUDY OF U.S. LOCAL GOVERNMENTS

by

NICK LEBREDO
B.S. United States Naval Academy, 1985
M.A. The Ohio State University, 1993

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Major Professors: Naim Kapucu
XiaoHu Wang
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ABSTRACT

Sustainability has been framed by the World Commission on Environment and Development as a fundamental concept in human society and by Fiorino (2010) as a critical conceptual focus for public administration over the next decade. A large number of U.S. local governments have implemented sustainability initiatives. Nevertheless, relatively few studies have comprehensively examined sustainability implementation by local governments.

This study makes a concerted effort to examine sustainability implementation in U.S. local governments, which have taken the lead in many areas of sustainability. This study also develops a capacity building model to empirically evaluate how organizational strategies and capacities influence sustainability practices at the local level of government through a national survey of U.S. cities with populations over 50,000.

The results show that cities are most successful in implementing sustainability initiatives if they develop proper technical, financial, and, particularly, managerial capacities and if they pursue primarily external, bottom-up, more participative, citizen or stakeholder driven strategies. These results suggest a public manager road map for sustainability implementation. From a theoretical perspective, the capacity building model adopted in this study provides a relatively powerful explanation of sustainability implementation, which demonstrates the value of a capacity building model in further studying sustainability implementation.
TABLE OF CONTENTS

LIST OF FIGURES ............................................................................................................. ix
LIST OF TABLES ................................................................................................................ x

CHAPTER ONE: INTRODUCTION ......................................................................................... 1
   Need for the Study ............................................................................................................. 2
   Research Questions .......................................................................................................... 3
   Hypotheses ........................................................................................................................ 3

CHAPTER TWO: LITERATURE REVIEW .............................................................................. 5
   The Concept of Sustainability ......................................................................................... 5
   The Role of Government in Sustainability .................................................................... 8
   Why Sustainability? - Theoretical Explanations ........................................................... 12
   Why the Capacity Building Approach? ......................................................................... 17

CHAPTER THREE: METHODOLOGY .................................................................................. 22
   An Empirical Model of Capacity Building for Sustainability ....................................... 22
   Data Collection ............................................................................................................... 25
   Response Rate ................................................................................................................ 26
   Follow-Up Non-Respondent Survey ............................................................................. 27
   Respondent Analysis ...................................................................................................... 29
   Index Creation and Level of Measurement .................................................................. 30
   Measuring Sustainability ............................................................................................... 31
   Measuring Capacities, Strategies, and Context ............................................................. 34
     Capacities ...................................................................................................................... 34
Correlation Results: Organizational Strategies .......................................................... 63
Citizen Engagement Strategies .................................................................................. 64
Non-Citizen Stakeholder Strategies ......................................................................... 65
Correlation Results: Conclusion ................................................................................ 66
Multiple Regression Assumptions ............................................................................. 68
Sample Size ............................................................................................................... 68
Descriptive Analysis of Residuals ............................................................................. 69
Other Regression Assumptions .................................................................................. 70
Multicollinearity ......................................................................................................... 72
Multivariate Normality ............................................................................................... 73
SEM Research Design ............................................................................................... 74
Initial Structural Equation Model ................................................................................ 75
Revised Structural Equation Model ........................................................................... 78
Examining The Three Hypotheses ............................................................................. 80
CHAPTER FIVE: CONCLUSION .................................................................................... 85
Practitioner Implications ............................................................................................. 85
Policy Implications ...................................................................................................... 88
Future Research .......................................................................................................... 89
APPENDIX A: EXPLANATIONS FOR PURSuing SUSTAINABILITY ................................. 92
APPENDIX B: CAPACITY BUILDING BENEFITS .......................................................... 94
APPENDIX C: CONTEXT VARIABLES ....................................................................... 96
APPENDIX D: SUSTAINABILITY SURVEY ................................................................. 99
APPENDIX E: INSTITUTIONAL REVIEW BOARD LETTER ........................................... 104
APPENDIX F: SUSTAINABILITY MEASUREMENT ITEMS ........................................ 106
APPENDIX G: CAPACITY MEASUREMENT ITEMS ...................................................... 108
APPENDIX H: STRATEGY MEASUREMENT ITEMS .................................................... 110
REFERENCES ........................................................................................................... 112
LIST OF FIGURES

Figure 1: Sustainability Dimensions ....................................................................................... 7
Figure 2: Interest Group Derived Support For Sustainability .................................................. 14
Figure 3: Empirical Model for Local Sustainability Efforts ...................................................... 23
Figure 4: Model Variables ........................................................................................................ 24
Figure 5: The Predictive Model of Sustainability Practices ..................................................... 25
Figure 6: Generic Structural Equation Model for Local Sustainability Management ............... 41
Figure 7: Local Sustainability Practices Implemented by 50% or More Respondents .......... 46
Figure 8: Local Sustainability Practices Implemented by 20% or Fewer Respondents .......... 47
Figure 9: Local Sustainability Outcomes Reported by Respondent Cities ............................ 53
Figure 10: Histogram Indicating Support for Normality Assumption .................................... 71
Figure 11: P-P plot Indicating Support for the Linearity Assumption ....................................... 71
Figure 12: Residual Scatter Plot Indicating Support for the Homoscedasticity Assumption ....... 72
Figure 13: Initial Structural Equation Model Results ............................................................... 76
Figure 14: Revised Structural Equation Model ......................................................................... 78
# LIST OF TABLES

Table 1: Responding Cities' Characteristics ................................................................. 44
Table 2: Sustainability Implementation ............................................................................ 45
Table 3: Organizational Capacities Used To Advance Sustainability .............................. 48
Table 4: Organizational Strategies Pursued to Improve Capacity .................................... 51
Table 5: Environmental Dimension of Sustainability ..................................................... 56
Table 6: Social Dimension of Sustainability ................................................................. 57
Table 7: Economic Dimension of Sustainability ........................................................... 58
Table 8: Political Capacity for Sustainability ................................................................. 60
Table 9: Technical Capacity for Sustainability ............................................................... 61
Table 10: Financial Capacity for Sustainability ............................................................. 62
Table 11: Managerial Capacity for Sustainability .......................................................... 63
Table 12: Citizen Engagement Strategies to Improve Capacity ....................................... 64
Table 13: Non-citizen Stakeholder Strategies to Improve Capacity ................................. 65
Table 14: Technical Strategies to Improve Capacity ....................................................... 66
Table 15: Descriptive Analysis of Residuals .................................................................. 70
Table 16: Correlation Matrix ......................................................................................... 73
Table 17: Evaluating Multivariate Normality with Mardia's Coefficient .......................... 74
CHAPTER ONE: INTRODUCTION

In this introductory chapter, the specific focus and need for the study will be described. Three research questions and corresponding hypotheses which will subsequently be examined in significant detail are also presented.

Many U.S. local governments have been adopting sustainability policies for quite some time (Jepson, 2004; Saha & Paterson, 2008). The principal question for these local governments is not what motivates their adoption intentions but how to best implement the policies. This dissertation examines the implementation of local sustainability. It develops a capacity-building framework that analyzes the impact of various organizational strategies on organizational capacity of implementing sustainability policies. Two principal types of organizational strategies that influence sustainability implementation, technically driven strategies and stakeholder driven strategies, are considered. Sustainability practices often depend on new technologies so it is necessary to develop technical expertise internally as well as to seek external guidance as needed. Implementing significant changes in an organization also involves garnering the support of stakeholders. Without the support of internal and external stakeholders, organizational change initiatives often meet resistance and fall short of expectations.

An organizational capacity model will also be utilized in this study. The organizational capacity model will hypothesize that the previously mentioned strategies contribute towards building organizational capacity in four critical areas of political capacity, technical capacity, financial capacity, and managerial capacity. The study will explore the utilized level of each
organizational capacity as well as how each organizational capacity influences the practice of sustainability by local leaders.

The results of this study provide policy makers with useful information on how to improve sustainability implementation. The results should also offer a useful modeling approach for future research of sustainability implementation.\(^1\)

**Need for the Study**

Notwithstanding the recent progress in this field, there is little research on the implementation of sustainability initiatives. While organizations have used various strategies to pursue sustainability initiatives, very little is known as to which local strategies or capacities tend to be more fruitful in advancing local sustainability so that scarce resources can be more optimally allocated. Consequently, one principal aim of this research is to more precisely identify how local implementation of sustainability practices are influenced by organizational strategies and capacities. In addition, the study will explore relevant contextual factors that may be significantly associated with the pursuit of sustainability at the local level.

The study will contribute to both the sustainability literature and practice. First, the results should help public managers develop proper organizational strategies that build organizational capacity for sustainability by providing a clearer picture of what is needed to not only sustain but advance local sustainability related efforts. The study should, as Fiorino (2010) recently urged, move the discussion on sustainability forward from debating why more

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\(^1\) The subject of this dissertation has been subsequently refined into a related manuscript that was submitted for possible future publication to *Public Administration Review* with Professor XiaoHu Wang, Professor Christopher Hawkins, and Professor Evan Berman.
sustainability is needed towards how to best guide implementation decisions by public sector managers. Second, the literature thus far has focused on the adoption of sustainability policies. This study examines sustainability implementation. It should serve to enrich the literature on sustainability by explaining what may drive sustainability implementation in government. With these objectives in mind, the study begins addressing this gap in the research by considering the following research questions and hypotheses.

**Research Questions**

1. Which current local organizational strategies are most effectively building organizational capacity for local sustainability management?
2. Which current local organizational capacities are most effectively advancing local sustainability management?
3. Can a capacity building model be useful in understanding differences in local sustainability management?

It is hypothesized that organizational strategies and organizational capacities are all contributing towards the advancement of local sustainability management albeit with different degrees of effectiveness. Consequently, the three theoretical hypotheses that will be addressed by this research are provided below.

**Hypotheses**

*H1:* Local organizational strategies are positively associated with the development of local organizational capacities that advance local sustainability management.
**H2:** Local organizational capacities are positively associated with local sustainability management efforts.

**H3:** A capacity building model of strategies, capacities, and relevant context variables can explain a significant amount of the variation in local sustainability management practices.

The first two hypotheses will be examined in significant detail since three different strategies (i.e., technical strategies, citizen engagement strategies, and non-citizen stakeholder strategies) and four different capacities (i.e., managerial capacity, financial capacity, political capacity, and technical capacity) will be individually considered.

Following this introduction, the study will include a relevant review of the literature in Chapter Two, a discussion of methodology in Chapter Three, the presentation of findings in Chapter Four, and the conclusion in Chapter Five.
CHAPTER TWO: LITERATURE REVIEW

This section reviews the relevant literature that helps answer the key research questions related to organizational strategies and capacities of sustainability implementation. To appreciate the multi-dimensional nature of the concept employed in this study, it starts with a review of the literature on defining sustainability. This is followed by a review of the important role of government in addressing negative externalities. Lastly, it examines theoretical explanations for pursuing sustainability initiatives and suggests why the capacity building model can be particularly useful during the implementation stage.

The Concept of Sustainability

Sustainability remains an elusive construct to precisely define and study. The related literature generally describes three separate dimensions of sustainability, i.e., environment, social, and economics (Conroy, 2006; Jepson, 2004; Portney, 2003; Saha & Paterson, 2008). The adoption of environmental, economic, and social sustainability principles in public sector management practices has received considerable scholarly attention (Bengston, 2004; Feiock, 2004; Mazmanian & Kraft, 2009; Ostrom, 1990; Portney, 2003). Over twenty years ago, the landmark Brundtland Report stated that sustainability is realized when it “meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p. 43). Nonetheless, the construct of sustainability as a fundamental guiding principle in public management has been lacking until recently when compelling arguments have been made to employ sustainability as a “conceptual
focus for public administration” (Fiorino 2010, p. 78); explore sustainability as “a new direction for public administration” (Leuenberger & Bartle 2009, p. 3); and, describe sustainable development as an emerging “dominant policy paradigm” (Saha & Paterson, 2008, p. 21).

Several definitions of sustainability exist. The term, environmental sustainability, is often referred to as a means to protect the ecosystem and natural resources, while sustainable development is frequently discussed as a strategy for pursuing enduring economic development that balances potentially competing concerns for social equity and environmental protection (Adams, 2006). The term, sustainable communities, is associated with building a healthy and high quality of life for a society (Hempel, 2009; National Research Council, 1999; Portney, 2003). Although different versions of the concept emphasize different aspects of sustainability, all appear to stem from a genuine concern about the deterioration of humans’ living environment, natural resource depletion, and the need to protect and restore the environment. A general agreement appears to emerge that sustainability consists of integrating and balancing three key dimensions (Adams, 2006). The goal of environmental sustainability relates to the protection and preservation of ecosystems and natural resources which provide a level of resources to sustain long term economic development and meet the needs of future generations. The aim of economic sustainability is to sustain an economic rate of growth that provides equitable economic opportunity and an economy that consumes limited resources efficiently and minimizes production waste. Similarly, social sustainability advocates balancing long term societal needs (including individual needs for foods, water, housing, medical care, transportation), needs of the environment, as well as the economic needs of the society (Adams, 2006).
Figure 1: Sustainability Dimensions

This three-pillar or overlapping circle approach depicted in Figure 1 provides a working framework for the research of sustainability (Adams, 2006). Mazmanian and Kraft (2009) and Fiorino (2010) expanded the concept from a largely environmental root to an integrated and balanced approach that was inclusive of environmental, economic, and societal elements.

Several concerns are essential in defining this three-pillar concept of sustainability. There is a need to achieve greater balance between social, economic, and environmental goals including developing a strong economy that reduces poverty and supports an acceptable quality of life. An empirical demonstration of the relationship among these components is sorely needed. There is also an urgency to protect the environment (Fiorino, 2010). While more balance between the components is needed, it may not be appropriate to treat the economic and social dimensions of sustainability as equivalent partners with the environmental dimension of sustainability since the latter represents more than merely a tradeoff with the others, but the setting in which the other dimensions operate (Adams, 2006). Consequently, sustainability has a common thread of emphasizing environmental protection. Lastly, sustainability inevitably appeals for a longer term horizon of decision making, a measurement of cross-generational
impact, and a concern for inter-period equity and welfare of future generations (WCED, 1987).

In summary, it can be argued that sustainability is advanced when greater balance between the three dimensions is attained and when longer rather than short-term considerations are given more weight in the decision-making process.

**The Role of Government in Sustainability**

The role of government in maintaining economic prosperity and social stability has been long established in the literature. In his well-known essay, *The Tragedy of the Commons*, Garrett Hardin described our predicament with respect to environmental management in the following manner:

The rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them. As long as we behave as independent, rational, free-enterprisers...we are locked into a system of fouling our own nest (Hardin, 1968, p. 1245).

Environmental resources are generally classified as either public or common pool goods. Common pool goods are a special type of public good. While pure public goods lack the exclusive and rival nature of private goods, common property resources lack only the former attribute (Steinemann, Apgar, & Brown, 2005). Examples of common property resources or collective goods include groundwater basins, fisheries, forests, pastures, lakes, public parks, and public beaches. These common pool resources often create negative externalities and potential private sector market failures (Steinemann et al., 2005). As Hardin noted above, unrestricted (i.e., nonexclusive) consumption of common pool goods can eventually lead to severe
degradation and, ultimately, destruction of the resource. Consequently, "effective management [of common pool resources] usually requires some sort of public intervention to protect the resource from being depleted or destroyed by overconsumption" (Steinemann et al., 2005, p. 225). Effective management of common pool resources is further facilitated when there are (1) low costs of resource use monitoring, (2) moderate rates of change in resources, resource-user populations, technology, and socio-economic conditions, (3) high levels of social capital, (4) low cost means of excluding outsiders, and (5) users that support compliance and enforcement (Dietz, Ostrom, & Stern, 2003).

The call for sustainability also requires further articulation of the role of government in mitigating environmental impact. The need for an active role of government in environmental sustainability can be framed in the argument from the overarching theory of carrying capacity which centers on the idea that the natural resources (e.g., water, land, fossil fuels, etc) to sustain life in the earth are limited and collective actions should be taken to control humans’ environmental impact (Ehrlich & Holden, 1974). The theoretical underpinning of environmental impact can be traced back to the formation of one of earliest attempts to describe the role of multiple factors in determining environmental impact: the IPAT equation (Commoner, 1972).

The original equation is written as \( I = P \times A \times T \), where \( I \) = environmental impact, \( P \) = population, \( A \) = affluence, \( T \) = technology. Environmental impact was further specified as \( I = P \times (I/P) \) where \( I/P \) was per capita environmental impact, or \( I/P = I/C \times C/P \) where \( C \) = consumption (Ehrlich & Holden, 1971). Furthermore, Environmental Impact (I) = Population Size (P) \( \times \) Consumption Per Capita (C/P) \( \times \) Environmental Impact Per Consumption (I/C) (Commoner, 1972). The impact of wealth (A) and technology (T) on the environment in the
original IPAT equation was reflected as per capita consumption (C/P) and environmental impact per consumption (I/C) (Commoner, 1972). While a classic debate on the relative influence of these factors subsequently ensued between Ehrlich, Holden, and Commoner, the IPAT model provides a useful framework for studying the forces that impact environmental change. The overlap between the IPAT model and the well-known POET human ecosystem model is noteworthy and suggests that the forces that impact environmental change may also have an interactive effect with each other (Dietz & Rosa, 1994; Duncan & Schnore, 1959).

Consideration of the IPAT equation suggests that, to advance sustainability policies and initiatives, governments should seek to incentivize consumption behaviors of individuals and organizations to favor products that use more renewable energy sources and are less environmentally harmful thus resulting in the reduction in environmental impact per unit of consumption (I/C). Governmental policies and initiatives in sustainability should also encourage individuals’ or organizations’ adoption of products that consume less energy and resources to promote the reduction of wasteful and inefficient consumption levels and thereby reducing per capita environmental impact.

Local governments account for the largest concentrations of population in the United States. Approximately 80% of the U.S. population resides in urban areas (U.S. Census, 2011). In the local context, according to Wackernagel & Rees (1996) and the theory of ecological footprint, local governments conduct sustainability activities for their own benefits. Because of limited resources, particularly land, to support the consumption of a city's population, cities need to subscribe themselves to sustainability activities to provide sufficient supply of food, shelter, and energy (Portney, 2003; Wackernagel & Rees, 1996). Dietz and Rosa (2008) also suggest that
population size and affluence are the principal environmental stressors of concern in terms of reducing ecological footprint. Research has similarly shown that thoughtful, analytical deliberation between scientists and interested parties including resource users, a variety of institutional types (e.g., public, private, community self governance), and complex and nested institutional arrangements are indispensable principles that tend to promote vibrant governance of environmental resources (Dietz, Ostrom, & Stern, 2003). The importance of a supportive institutional structure, effective personal communication, and the use of coordinating mechanisms are paramount and have been shown to promote sustainable resource use (Hackett, Schlager, & Walker, 1994; Ostrom, Gardner, & Walker, 1994).

From a financial perspective, according to the State and Local Government Finance section of the U.S. Census Statistical Abstract of 2012, state and local governments spent nearly $200 billion on environmental and housing related concerns in 2008, the latest year state and local information was available. The functional categories included in these expenditures were natural resources ($33.9 billion), parks and recreation ($40.6 billion), housing and community development ($51 billion), sewage ($46.7 billion), and solid waste management ($23.8 billion). The vast majority (nearly 80%) of this spending occurs at the local level. Across the country, the average proportion of state and local budgets devoted to environmental related spending was 2.3 and 9.5%, respectively (U.S. Census, 2011). While many state and local environmental budgets have been supported with American Recovery and Reinvestment Act funds over the last three years, the fiscal constraints that federal, state, and local governments are experiencing will likely have an adverse effect on state and local environmental budgets when these supplemental funds are no longer available (ECOS, 2010).
Betsill contends that local governments, particularly in developed countries, are most effective in addressing environmental matters when a city is successful in relating these concerns to local issues, i.e., "think locally, act locally" (Betsill, 2001, p. 395). The former Speaker of the House, "Tip" O'Neill, stated that "all politics is local" (O'Neill, 1994, p. xvi). As further support for local governments as the unit of analysis, the 2009 Nobel prize winner in economics, Elinor Ostrom, a political scientist who focused her research on improving the governance of the commons, suggested that the most effective sustainability policies adapt to local cultures and institutional arrangements (Ostrom, 2008). Substantial research supports this notion that sustainability development may potentially be best addressed at the local level (Banerjee, 2003; Gibbs, 2002; Goldman, Thompson, & Daily, 2007).

**Why Sustainability? - Theoretical Explanations**

There is relatively scarce literature that systematically examines the success of implementation in sustainability. However, there are several theoretical explanations that propose motives of governments adopting sustainability initiatives. This study presents these various explanations, not for testing their respective validities, but for understanding potential factors that could be considered in the empirical model of the dissertation. Adapting a definition scheme from Mazmanian and Kraft (2009) who classify foci of different environmental policy epochs, the table in Appendix A summarizes the key components of these four explanations.

The first explanation is provided by the analytical framework of pressure-state-response (PSR) in the environmental monitoring literature in which governmental policies and actions are part of societal responses to the pressure induced by human activities on the environment
Government sustainability efforts are a result of institutional policies and actions in response to natural resource depletion and consumption that occur during production processes that utilize natural resources and other forms of capital (OECD, 1993). Consistent with this framework, government sustainability efforts should be associated with the pressure and demands on the environment created by the production process. The PSR framework developed by the Organization for Economic Cooperation and Development over twenty years ago emphasizes the urgency of addressing a deteriorating environmental state. It is commonly used as a reporting tool for developing environmental performance indicators (OECD, 1993).

As a case in point, recently, a water sustainability study sponsored by the National Resources Defense Council (NRDC) revealed that nearly a third of all U.S. counties will be challenged with increased risk of water shortages within the next forty years (NRDC, 2010). In Florida, as the miles of nutrient impaired waters nearly doubled between 2008 and 2010, the federal Environmental Protection Agency (U.S. EPA) was pressured to unprecedentedly compel the state and its municipalities to adhere to higher water quality standards (U.S. EPA, 2011).

The PSR framework, therefore, is consistent with the initial epoch of the environment movement that was primarily concerned with regulating environmental protection (Marzmanian & Kraft, 2009). Notwithstanding the important contribution to the development of sustainability indicators (UNCSD, 1996; Eurostat, 1997), the PSR framework and its subsequent variants appear limited in their ability to explain why certain local governments, particularly in the developed world, are more proactive with their sustainability efforts while other similarly positioned governments assume a more reactive stance.
A second explanation of government sustainability efforts emphasizes political pressure created by forces outside government from citizens. It is rooted in the theory of new political culture which specifies an emerging propensity, particularly among highly educated and younger citizens, to favor a left-liberal predisposition in many postindustrial countries (Clark & Inglehart, 1998; Rosdil, 1998; Sharpe, 2005). Specifically reflected in studies of environmental policies, public support (as shown in Figure 2) is placed as an intermediate variable that links their socioeconomic and political ideology statuses with their attitudes toward sustainability-related policies.

*Socioeconomic status → Political Ideology → Support for Sustainability → Sustainability Initiatives*

Figure 2: Interest Group Derived Support For Sustainability

Several studies including Hawkins (2011), Konisky, Milyo, and Richardson (2008), Ramirez (2009), and Saha (2009) have provided empirical evidence that supports this relationship, i.e., establishing a plausible hypothesis that socioeconomic status and political ideology determine the extent of support for governmental efforts in sustainability and that this support transforms into the actual level of sustainability in a democratic society. Saha (2009) found a significant relationship between sustainability activities and an index measuring the new political culture in a multivariate analysis of the fifty largest U.S. cities. Based on her research, Saha (2009) found that 30% of the variation in a city's sustainability was attributable to variations in political culture. More specifically, Saha (2009) found that younger, more educated, more professional, and non-traditional households tended to be more supportive of sustainability.
In an explanation about the political context of environmental predisposition — whether environmental protection is considered a progressive issue and whether political propensity is considered a major factor in explaining citizen support on environment-related spending — one study found that political orientation is a consistent predictor of environmental preferences (Konisky, Milyo, & Richardson, 2008). Similarly, a related study concluded that the "political culture matters greatly" (Saha, 2009, p. 46). There is also substantial support in the literature for the influence of interest groups in formulating and implementing environmental policy. Recent research has empirically shown that smart growth policy adoption can be explained by interest group preferences among business and local neighborhood groups (Hawkins, 2011; Ramirez, 2009). Related research has also proposed the notion of a "political market" as a conceptual framework where environmental policy is formulated and implemented as a result of "political transactions" that occur between government officials and relevant interest groups, i.e., supporters of environmentalism (Lubell, Feiock, & Ramirez, 2005, p. 708). Similar findings suggest that those cities with more political forms of government i.e., mayor-council may be more inclined to support sustainability initiatives than those where the form of government is council-manager (Bae, Feiock, & Kwon, 2011).

A third possible explanation of sustainability in government can be developed from institutional theory, particularly institutional isomorphism. From this perspective, sustainability can be seen as a form of organizational change which can be caused by an organization’s political, institutional, or financial mandates (coercive isomorphism); responses to uncertainty in the environment, attempt to imitate success in sustainability practices in others (mimetic isomorphism); or, desires to conform with a certain social, institutional or professional form
established in sustainability practices, i.e., normative isomorphism (DiMaggio & Powell, 1983). One application of institutional theory is in the field of management innovation (Berry & Berry, 2007; Walker, 1969; Walker, Avellaneda & Berry, 2011) to describe how innovation (in this case sustainability practices) spread. Berry suggests that innovations in the public sector are more likely to be successful if rapid diffusion occurs while Walker, et al concluded that public pressure driven models are likely to be associated with lower levels of innovation (Berry & Berry, 2007; Walker, Avellaneda & Berry, 2011). It is suggested that diffusion theory may be more applicable when a certain set of normative and institutional forms or practices of sustainability are more established and further developed since innovations are more likely to be diffused if there are unequivocal proven early adopters. Because sustainability in many local governments is perhaps still rather new, the applicability of diffusion theory as an explanatory framework at this point may be somewhat limited, if not premature.

Finally, a fourth explanation stems from the literature of organizational capacity building, which emphasizes the organization’s internal dynamics in obtaining resources to support sustainability efforts. The root of this approach stems from the literature on organizational effectiveness and on organizational change, in which stakeholder involvement, collaborative nature of involvement, resource and technical capacities, and human influence (rather than organizational structural and context) are emphasized. According to this framework, organizational internal capabilities and constraints are what principally set the agenda and largely determine outcomes and performance (Miller, 1992; Wilson, 1989).

In a related study on competing theories, Whitford (2007) concluded that organizational capacity and constraints were more reliable in predicting the preferences and actions of an
organization than either political or environment based explanations. It is suggested that these four explanations may be complementary not competing, meaning that explanatory elements of one do not directly contradict another. Rather, these explanations focus on different explanatory elements, highlight different organizational factors, and suggest different paths of interactions of these factors. Studies focusing on different explanations may highlight different strategies in sustainability and may also be more or less relevant depending on the developmental stage of the adopter. As Lewin (1951) suggested over sixty years ago, successful organizational change essentially involves three stages: unfreezing or unlearning current behavior, learning new behavior, (i.e., the change), and reinforcing or refreezing the changed behavior. From this perspective, the environmental and political response frameworks appear primarily consistent with the unfreeze or cognitive dissonance aspect of the change process while capacity building and diffusion are more aligned with the actual change implementation and reinforcement stages, respectively. Because many local governments in the United States have adopted sustainability initiatives (Jepson, 2004; Leuenberger & Bartle, 2009; Portney, 2003; Saha & Paterson, 2008), this study further examines the capacity building approach to better understand what these governments have done to help them undertake these initiatives.

Why the Capacity Building Approach?

In this study, the capacity building approach is supported because it is seen as the primary driver that helps organizations fulfill and expand their mission. Capacity is the key variable that influences implementation which, in turn, impacts organizational performance (Ingraham & Donahue, 2003; Krause, 2011). High capacity governments are more likely to be the high
performers (Ingraham & Donahue, 2003). It is time to look beyond the formulation of sustainability as primarily a worthy concept for debate to one that regularly "guides decision-making and action" (Fiorino, 2010, p. 86). While research supports, as Portney (2010) suggests, that many cities are indeed taking sustainability more seriously and have moved into the implementation stage, this makes the case for capacity building even more timely. Capacity building can enable cities to not only implement sustainability related actions but to maintain and improve upon current practices. Consequently, for cities to progress further into the implementation stage of sustainability, there is a strong demand for capacity building at this time.

Additionally, to sustain the viability of the concept, it is also argued that local governments is where we must be able to demonstrate that effective strategies are being employed and necessary capacities are being developed to undertake sustainability. As devolution and decentralization trends continue in government, local governments that thrive will likely be those that build their own networks of resources and organizational capacities and, consequently, become less reliant on higher levels of government. According to the principle of subsidiarity, local governments are in the best possible position to respond to local environmental conditions and to accordingly practice adaptive management. Adaptive management is possible when learning from experimentation is facilitated. Local governments are where decision-makers are most familiar with the needs of their constituents as well as proximate environmental pressures. Local governments are also where decision-makers are most connected with citizens and relevant stakeholders and, thus, have the greatest opportunity to
develop social capital which is necessary for consensus building when working with diverse stakeholders with different and often competing needs (Putnam, 1995).

Capacity building is necessary to develop the resources, relationships, and leadership skills that are necessary to address difficult problems (Kapucu, Augustin, & Krause, 2007). A common error associated with change initiatives is not paying adequate attention to institutionalizing the change through modification of social norms, shared values, and organizational culture (Kotter, 1995). For skeptics or those that may be resistant to change, there is no better way to alter such behavior than by demonstrating that an organization has acquired the capability to achieve meaningful results (Kotter, 1995). Stated more simply, the enduring success of local sustainability management depends on local sustainability performance. In accordance with institutional theory, capacity building is viewed as a means of transforming local sustainability management from a pressure-driven initiative (i.e., coercive isomorphism) to an internal value driven goal (normative isomorphism). When this professionalization occurs, local sustainability initiatives may be more vigorously pursued because they have been accepted by the institutional culture as something that works (i.e., having proven legitimacy) rather than because they are mandated by environmental or external pressures (DiMaggio & Powell, 1983). Additionally, developing a deeper understanding of local capacities and their relationship to performance outcomes may also be helpful in terms of recognizing interdependencies and weighing the tradeoffs of transaction costs when local governments consider strategically pursuing collaborative relationships such as joint ventures (Hawkins & Andrew, 2010).

In the current epoch of moving toward sustainable communities, capacity building, local/regional collaborations, and collective decision-making are regarded as the predominant
political and institutional context (Mazmanian & Kraft, 2009). Recent research on collaborative sustainability partnerships suggests that social capital that is built on trust and norms of reciprocity is a first order output that leads to sustainability effectiveness (Lubell, Leach, & Sabatier, 2009). The literature also states that effective collective action and governance is highly dependent on supportive networks and the synergistic bonds of social capital (Putnam, 1995). Capacity building offers the potential to strengthen the nodes as well as the linkages associated with networks. By investing in capacity building, cities can not only improve their own capabilities but also strengthen relationships that further expand their potential for organizational learning and growth (Appendix B).

It is also suggested that capacity building is closely associated with the experimental approach to innovation that tends to be more relevant under typical institutional constraints of bounded rationality (Simon, 1991). As Galenson (2006) has posited, experimental innovation is based on persistent trial and error to discover what works and what does not. As opposed to deductive, abstract thinking breakthroughs that may occur from conceptual innovation, experimental innovation is based on systematic, experiential learning that is concrete and confirmed through empirical evidence. While this approach to innovation or change management is less ambitious and transformational, it may mitigate risks and prove more enduring. With high levels of uncertainty, organizational innovations are likely to be more sustainable if they are supported with a series of small wins that are reinforcing and serve to continue the momentum of the change initiative (Kotter, 1995; Weick, 1994). The capacity building approach can be instrumental in helping a local government manage risks as well as achieve critical benchmarks of success.
Finally, effective capacity building that leads to exemplars of organizational effectiveness may not only promote organizational learning but also potentially enhance diffusion and mimetic isomorphism (DiMaggio & Powell, 1983; Simon, 1991). While both internal and external pressures influence support for innovations, external influences are more likely to have an adoption effect when there are neighboring governments that can serve as successful examples (Berry & Berry, 2007; Knox, 2006). To ultimately promote effective diffusion of best practices, it is deemed essential to develop a better understanding of what works and what does not so that acquired knowledge and experiences can be productively shared and future resources can be appropriately allocated towards their best use.

In conclusion, the capacity building literature suggests that organizational effectiveness, adaptability to change, and organizational learning can all be significantly enhanced when an organization emphasizes the development of various organizational strategies that build essential organizational capacities.
CHAPTER THREE: METHODOLOGY

An Empirical Model of Capacity Building for Sustainability

Organizational capacities can surface in many forms. Leavitt (1965), with his well-known diamond model, contributed to the organizational effectiveness and change literature by emphasizing the interdependencies between structure, technology, task, and people. Whitford (2007) suggested that organizational capacity is a more valid explanation of organizational decision-making than political or task environmental explanations. In general, a discussion on capacity building in the literature of organizational effectiveness suggests that organizational capacity is associated with goal development, resource acquisition (including both human resources and financial resources), customer satisfaction, quality of internal processes, and adaptability to its environment (Daft, 1997; Mintzberg, Raisinghani, & Theoret, 1976; Pfeffer & Salancik, 1978).

Notwithstanding, the most in-depth examination of capacity building appears in performance management literature in which the ability of an organization to install and implement performance management system is the main question of the inquiry. In the Government Performance Project (GPP), for example, organizational performance is linked to managerial capacity in developing subsystems in financial management, human resource management, capital management, and information technology management (Ingraham, Joyce, & Donahue, 2003; O'Leary, Durant, Fiorino, & Weiland, 1999; Pew Center on the States, 2010; Rainey, 2009). Studies have also identified the need for financial, technical, and most important,
stakeholder supports in implementing performance management reforms (Berman & Wang, 2000; Bingham, O’Leary, & Nabatchi, 2005; Julnes & Holzer, 2001).

The literature suggests an organizational capacity building model should consist of several key components. The approach emphasizes a systematic means of integrating political support, financial resources, managerial execution, and technology. It also emphasizes the need to identify organizational strategies to acquire these capacities and an understanding about the political and institutional context in which the strategies work (Denhardt & Denhardt, 1999; Lawrence & Lorsch, 1967; Scott, 2003). Moreover, it stresses the dynamic, interactive, and collaborative nature of the policy making process and importance of building stakeholder support, and advocates a model to develop support from relevant stakeholders (i.e., citizens, businesses and other stakeholders outside a government) by identifying their motives for sustainability and meeting their expectations to promote greater participation (Bingham, O’Leary, & Nabatchi, 2005). The capacity building approach also emphasizes the need for developing an organizational culture that is critical for intermediate and long term organizational support of innovative policy changes (Cohen & Eimicke, 1998). As depicted below in Figure 3, the general empirical model related to local sustainability efforts that will be studied can be written as:

\[ \text{Local Sustainability Efforts} = F (\text{context, capacity, strategy}) \]

Figure 3: Empirical Model for Local Sustainability Efforts

As indicated in Figure 4, context and strategies are latent exogenous variables and capacities and sustainability practices are the latent endogenous variables. In the predictive model (Figure 5), strategies can be seen as immediate actions taken to build capacity for
sustainability related practices and capacities can be seen as intermediate or longer term results of these strategic actions. An organization’s context is critically important in specifying the causes of sustainability because sustainability can be framed as the result of the conflict in various viewpoints of political attitudes, resource availabilities, environmental pressures, and demographics of a community (Van de Ven & Poole, 1995). Consequently, the context variables should reflect values, policy priorities, and service efforts in adjusting the possible conflicts between environmental protection and socioeconomic goals. While it can be argued that context variables may also affect strategies and capacities, correlation analysis (Appendix C) revealed that their influence was weak with most relationships being insignificant. Since the focus of this study was on sustainability implementation, further complexity in the modeling process was only deemed desirable if it yielded a significant contribution to the model fit or explanatory power.²

<table>
<thead>
<tr>
<th>Exogenous Variables:</th>
<th>Citizen Engagement Strategies  (measured by 11 item summative index)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Citizen Stakeholder Strategies  (as measured by a 5 item summative index)</td>
</tr>
<tr>
<td></td>
<td>Technical Strategies  (measured by 5 item summative index)</td>
</tr>
<tr>
<td></td>
<td>Context variables  (27 census and self-reported measures)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Endogenous (Mediating) Variables:</th>
<th>Political Capacity  (as measured by a 10 item summative index)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Technical Capacity  (as measured by a 4 item summative index)</td>
</tr>
<tr>
<td></td>
<td>Financial Capacity  (as measured by a 7 item summative index)</td>
</tr>
<tr>
<td></td>
<td>Management Capacity  (as measured by a 11 item summative index)</td>
</tr>
</tbody>
</table>

| Endogenous (Outcome) Variable: | Sustainability  (as measured by a 51 item summative index) |

Figure 4: Model Variables

² The researcher recognizes the possibility of alternative models that further integrate the consideration of context variables and their respective indirect influences on sustainability efforts through strategies and capacities.
Figure 5: The Predictive Model of Sustainability Practices

**Data Collection**

This study draws on multiple data sources. Data for contextual variables are from the U.S. Census and other government related documents. A survey was developed to obtain data on a sustainability index, sustainability strategies, and capacities (Appendix D). The survey used in this study was designed by Dr. XiaoHu Wang (initial dissertation chair), and Dr. Christopher Hawkins, also a dissertation committee member. The survey instrument does not contain any personally identifiable information and requests information solely on organizational activities. All survey respondents were advised that their individual responses will remain confidential and that an aggregate descriptive summary of the results will be made available upon request. An exemption from the Institutional Review Board (IRB) was obtained by Dr. Hawkins prior to conducting the survey (Appendix E). As a doctoral student advised by these two faculty members, this researcher assisted Dr. Wang and Dr. Hawkins with the data collection for the survey and was granted permission by Dr. Wang and Dr. Hawkins to use the collected data as a secondary database for this study.
The data collection for this research was completed between September 2010 and March 2011 with multiple waves. The sampling frame was provided by the National League of Cities and included all cities in the United States with populations greater than 50,000 based on the 2000 U.S. Census. The population of the 601 cities in the sampling frame accounted for approximately 35% of the total population of the U.S. but less than one percent of the total land area (U.S. Census, 2000). After a pretest on a group of about 15 city managers, the survey instrument was mailed to chief executive officers or chief administrative officers in the cities with populations greater than 50,000 in the United States.

Response Rate

To maximize response, many key elements (e.g., respondent-friendly questionnaire, personalized correspondence, return envelopes with prepaid first class stamps, and multiple contacts) of Dillman's Tailored Design Method were utilized (Dillman, 2007). However, no financial incentives were offered to complete the survey. Of the 601 cities in the sampling frame, 264 responded to the survey, for a response rate of 44%.

For broad comparison purposes, according to recent research that analyzed survey response rate trends among more than 100,000 organizations in seventeen refereed academic journals, the average response was 35.7% (Baruch & Holtom, 2008). More narrowly, when considering a recent survey that drew from a similar sampling frame (i.e., city managers from cities with populations of 50,000 or higher), a widely cited 2006 social entrepreneurship study published in a peer-reviewed academic journal, Public Administration Review, yielded a response rate of 37% (Korosec & Berman, 2006). In addition, it is noted that three recent local sustainability surveys attained response rates ranging between 26% to 61% (Jepson, 2004;
Conroy, 2006; Saha & Paterson, 2008). While this study's response rate (44%) was not the highest among these cited, it can be argued that, among these prominent sustainability studies in the literature, this study may come closest to a true national survey on local sustainability practices. This study includes responses from cities in 42 of the 50 states. Furthermore, this study had the largest sampling frame (601) as well as the largest number of respondents or sample size (264) among these related studies published in leading peer-reviewed journals.

While higher response rates are clearly desirable, it is also recognized that, in the field of public administration, elected officials and public managers are recipients of multiple appeals to complete surveys on related topics and this may result in lower participation rates. Notwithstanding this challenge, studies based on surveys with lower participation rates can still make valuable contributions to the literature and studies with higher response rates do not necessarily imply higher quality findings (Yang & Miller, 2008).

**Follow-Up Non-Respondent Survey**

For response rates lower than 80%, the literature recommends a follow-up with five to ten percent of non-respondents on critical portions of the survey (Tuckman, 1999). Given the previously noted response rate (44%), a shorter follow-up survey of non-respondents was completed in August 2011. The included questions on the non-respondent survey were related to the three dimensions of sustainability and the respondent's familiarity with sustainability activities. This shorter survey of non-respondents attained a response rate of nearly eight percent (26/337). The percentage of respondents indicating a high degree of familiarity (i.e., 'familiar' or 'very familiar') with sustainability activities was relatively equal (92.3% for the follow-up non-
respondent survey versus 97.2% for the main survey). The sustainability index scores among the non-respondents (N=26) ranged from 2 to 42 with the average aggregate score being 15.1 or 30% of the items on the sustainability scale. This was only marginally lower than the average aggregate sustainability index score of 16.9 or 33% of the items on the aggregate sustainability scale for the study's main respondents (N=264). This difference was not significant (t=.945, p=.345, two-tailed test with unequal population variance assumed) at the .05 level. Similar tests were completed on each of the three dimensions of sustainability and while non-respondent implementation levels were lower for each of the three respective dimensions, none of the differences from the adoption levels reported by the respondents were statistically significant. For the environmental sustainability scale, the range of scores was from 2 to 16 while the mean index score for non-respondents was 7.0 compared to 7.5 for respondents (t=.508, p=.615). For the economic sustainability scale, the range of scores was from 0 to 17 while the mean index score for non-respondents was 3.7 compared to 4.5 for respondents (t=.838, p=.409). For the social sustainability scale, range of scores was from 0 to 11 while the mean index score for non-respondents was 4.4 compared to 4.9 for respondents (t=1.02, p=.317).

Notwithstanding this analysis, it is recognized that those that are above average practitioners of sustainability may be the most likely respondents to this survey. While this possibility may somewhat limit the representativeness of the survey, it is suggested that the experiences of early adopters or more experienced implementers can still provide valuable insights on the validity of the empirical model in terms of advancing sustainability implementation efforts.
Respondent Analysis

Of the final 44% that responded, 40% identified themselves as city managers, chief executive officers, or chief administrative officer. Twenty eight percent were sustainability managers while 7.2% were planner directors. Other respondents included environmental policy directors, energy and environmental directors, mayors, economic development directors, public works directors, and solid waste directors. Virtually all (97.3%) of respondents indicated they were very familiar or familiar with their cities’ sustainability activities.

Tests were conducted to determine whether responding cities were significantly different than non-responding cities on key socioeconomic characteristics. Respondents were compared to non-respondents on the basis of 2000 census population and median household income. There were 264 respondents and 337 non-respondents. The mean city population for the respondents and non-respondents was 176,272 and 156,211, respectively. This difference was not significant (t=0.602, p=0.548, two-tailed test with unequal population variance assumed) at the .05 level. The average median household income for respondents and non-respondents was $45,241 and $42,396, respectively. While there was substantially greater variability among incomes, the mean income difference was not significant (t=1.961, p=0.05) at the .05 level. With respect to form of government, the council-manager and mayor-council forms of government were, respectively, present in 66.0% and 31.0% of respondent cities. These percentages are similar to the results of 62.0% and 35.9% represented in the ICMA’s Municipal Year book (2010) for these two forms of governments in U.S. cities with populations over 50,000 (ICMA, 2010).
Index Creation and Level of Measurement

A summated index was created for the sustainability dependent variable as well as each of the organizational strategy (i.e., citizen engagement, non-citizen stakeholder, and technical) and organizational capacity (i.e., political, technical, financial, and managerial) variables. Given the objective of measuring implementation practices, a summated index was selected in lieu of factor analysis (that emphasizes data reduction) in order to be more comprehensive and inclusive. For the sustainability dependent variable, all dimensions were treated equally. To focus the attention on implementation progress, no weights were utilized for the items across all scales. The creation of the indices resulted in each of these variables having the interval level of measurement since there was a fixed interval of one activity between each score on the respective scale. The context variables ranged between the nominal level of measurement (e.g., west coast or planning legislation state) and the ratio level of measurement (e.g. population, median household income, median age).

The sustainability, capacity, and strategy variables were created by summing ordinal data and developing a summated index for each respective variable. While it is recognized that ordinal level data is normally restricted to the use of nonparametric statistics, it is relatively common practice to treat summated scores gathered from social science research as interval-ratio level data since such scales frequently possess characteristics that fall between these levels of measurement (Spatz, 2008). For example, each item of these summated scales makes an equal contribution to the total sustainability score and it is possible to say that a city that has implemented 24 activities has implemented twice as many as one that has implemented only 12. Furthermore, while this treatment may be controversial among some statisticians, the key
concern among nearly all statisticians with the use of parametric statistics (e.g., regression) is not whether the data are ordinal, interval, or ratio but with the level of compliance with the assumption of normality, particularly for the dependent variable, which will be evaluated in a subsequent section (Gliner, Morgan, & Leech, 2009).

Measuring Sustainability

Measuring sustainability is challenging because of the ambiguous and evolving nature of the concept. The development of the measurement in this study considered the existing literature as well as a validity assessment of the measurement. A sustainability index was developed to assess a government’s practices to lead, initiate, coordinate, design, and implement actions in environmental, economic, and social sustainability.

The measurement development in this study relies primarily on two measurement models to develop and categorize specific items. In developing items of environmental sustainability, this study relies on a model of Florida Green Building Coalition (FGBC) which specifies more than 300 items of municipal sustainability initiatives to include a comprehensive range of 19 city functions in categories of energy, air, water, waste, health, land use, and sustainability awareness. The Florida Green Building Coalition items are weighted from one to 20 with higher scores indicating more importance in the sustainability measurement scheme. Most items, nearly 75%, scored only 1 point. Only 16 items scored five points or higher with one item scoring 20 points and four items scoring 10 points. This study only considered items weighted two points or higher, which represented the top 25% of items in terms of their perceived impact on
sustainability. Seventeen items were eventually used in this study to measure environmental sustainability (see Appendix F for these items).

The measurement development in this study also considers the classification scheme used by Saha and Paterson (2008) who conducted a comprehensive review of previous studies. Saha and Paterson (2008) compared municipal sustainability initiatives across studies and classified them into categories of environmental protection initiatives, economic development initiatives, and social justice and equity initiatives. In this classification, environmentally friendly economic development initiatives in energy and resource efficiency are given an important role. The development of specific measures of this index considers spatial aspects and characteristics as well as incentive policies in development. These measures reflect the general emphasis on local quality of life and strategic investments by local governments in businesses and economic development programs that focus on technology and entrepreneurship, and that minimize energy use and help to accomplish goals of resource protection. There has been some tendency to consider the environmental dimension of sustainability as a competing value or tradeoff for economic development and growth (Portney & Cuttler, 2010; Jeong & Feiock, 2006). However, this difficult choice may not be necessary in the future with continuing advances in technology and changes in the underlying structure of the economy (Friedman, 2007). Therefore, the 23 economic sustainability measures in this study focus on the need to maintain economic competitiveness while minimizing the impact on the environment (see Appendix F for these items).

It is widely recognized in the literature that social sustainability is the least developed of the three dimensions of sustainability (Partridge, 2005). The concept of social sustainability in
this article centers on the idea of social equity and equally utilized resources for social groups in sustainability development – notions suggested by both Mazmanian and Kraft (2009) and Saha and Paterson (2008). Based on this perspective, social sustainability, is associated with quality of life and equity. With this definition in mind, social sustainability efforts in providing affordable housing, developing affordable transportation means, and on the provisions of affordable life necessities (such as water supply and food supply) were used. Accordingly, the index of social sustainability includes 11 indicators of social sustainability efforts (see Appendix F for these items).

Several criteria were used to ensure the validity of the items selected. First, items will reflect the sustainability practices as perceived by executives in relevant capacities, particularly their leadership in sustainability management. In other words, the items have strong face validity. Second, items mainly measured government-wide (city-wide) efforts. Items that applied a specific function (department) or a limited number of functions were minimized. For example, tracking energy use should be an effort for the whole government, not just for one or two departments. Third, consideration was also made to ensure that the items (thus the activities they measure) were applicable to all governments so the survey respondents could easily answer the questions. The sustainability efforts measured should not be region-specific or area-specific. Items specifically for coastal areas or a program only available in a specific state or region were ruled out. In summary, 51 survey items were eventually used to construct a three dimensional (environmental, economic, and social) sustainability index (all scale items provided in Appendix F). In spite of the above efforts to strengthen the measurement validity, these items, by no means, are an all-inclusive reflection of all sustainability initiatives. Notwithstanding this recognized
limitation, these measures represent important dimensions of sustainability efforts in city government.

**Measuring Capacities, Strategies, and Context**

**Capacities**

Capacities concern an organization’s ability to carry out its mission (Ingraham, Joyce, & Donahue, 2003; Johnson, Hays, Center, & Daley 2004; Pew Center on the States, 2010). The literature has specified several organizational capacities that may influence sustainability efforts in government (Grindle & Hilderbrand, 1995; Ingraham, Joyce, & Donahue, 2003; Pew Center on the States, 2010). In developing specific capacity measures, this study adopts a framework used by the International Development Research Centre of Canada. There are, broadly speaking, hard organizational capacities and soft organizational capacities (Horton, Alexaki, Bennett-Lartey, Brice, & Campilan, 2003). This study uses two harder capacities (i.e., financial capacity and technical capacity) and two softer capacities (i.e., managerial capacities and political capacities). Further detail is provided below on each capacity and the complete list of items used to measure sustainability related capacities are provided in Appendix G.

Managerial capacities reflect an organization’s ability to develop goals and principles, incorporate the goals and principles into the strategic planning process and operations, and monitor and assess the achievement of these goals. More specifically, the survey instrument requests information on whether the city has established a dedicated sustainability office or position and if a sustainability plan has been developed. The instrument also requests information on whether sustainability principles have been integrated into on-going planning and
operations. With respect to performance measurement and evaluation, there are questions that seek information on whether sustainability indicators have been established, if they are regularly monitored, and if sustainability improvement actions have been initiated following evaluation.

Financial capacities refer to an organization’s ability to assemble available resources to support the mission. Specific questions in this area seek information on whether the city actually has dedicated operating or capital budgeting for its sustainability initiatives and if this funding effort has been maintained over time. Financial capacities are also measured by the extent to which the city has adopted tools of governance such as grants or tax incentives to promote sustainability or issued debt to pursue a sustainability related project.

Political capacities reflect the level of support obtained from stakeholders in implementing policies and practices. This variable measures the extent to which city leaders believe there is internal as well as external support for their sustainability efforts. Internal political capacity is related to perceived support from stakeholders within the city such as the mayor, city manager, department heads, managers/supervisors, and employees. External political capacity is measured by stakeholder support from legislators, other government agencies, businesses, and non-profits.

Technical capacities refer to the ability of an organization to use technologies required for sustainability. Technical capacity can also be internally generated or externally sought. Internal technical capacity depends on the technical expertise of city staff and whether they have the capability to undertake sustainability related initiatives independently. In contrast, external technical capacity depends on the availability of outside experts such as professional associations, private consultants, and universities or research institutions.
Strategies

There are various strategies to implement sustainability initiatives. A recent emerging strategy suggested by the literature is a political strategy to involve stakeholders such as citizens, elected officials, businesses, and nonprofits in sustainability efforts (Portney, 2005, 2007; Portney & Cuttler, 2010). Involvement of political stakeholders should help them understand the significance and need of sustainability initiatives, and thus improve the abovementioned capacities particularly political, financial, and managerial capacities.

The literature has particularly emphasized the importance of involving citizens in sustainability initiatives (Conroy & Berke, 2004; Portney, 2005, 2010; Portney & Berry, 2010) so this study distinguishes between citizen involvement strategies and strategies of involving other political stakeholders. Examples of citizen involvement strategies include citizen surveys, citizen boards and commissions, information provision activities, local neighborhood organizations, and community workshops. Examples of non-citizen stakeholder strategies include seeking involvement from city employees, management, legislators, businesses, and non-profits in sustainability related activities.

Additionally, since many sustainability initiatives involve the use of technologies, strategies to seek technical expertise are also measured in this study. Examples of technical strategies include seeking technical expertise from the city's own staff as well as from external sources such as private consultants, universities, research institutions, and professional organizations. In addition, strategies that were employed to adopt best practices from other governments are also included. The complete list of items to measure sustainability related strategies are provided in Appendix H.
Context

The contextual impact on sustainability should consider the inherent conflict and potential tradeoffs between environmental protection, economic and social goals. The contextual variables in this study consist of four groups—the conflicting goals in political attitudes towards sustainability; financial slack (i.e., resources available for sustainability practices particularly during the economic downturn); environmental pressures of human activities; and demographics of a community. Measures of political attitudes include percent democratic presidential vote (2008) and two survey items on political propensities (e.g., politically liberal or progressive orientations) of city residents and elected officials. Variables measuring resource availability consisted of multiple survey items on revenue shortage, decline, financial reserve, and employment loss. The variables measuring environmental pressures included population size and growth, population density, percentage of urban populations, land size, income, and manufacturing industrial size. The demographics variables consisted of measures of poverty rate, resident median age, residents’ educational level and income, and white and black percents of populations. In addition, the form of government and geographic location (cities located in the West Coast) were also included. The census derived measures related to environmental pressures and demographics were obtained from the 2009 American Community Survey unless specifically noted otherwise in Appendix C (U.S. Census, 2009). Respondent data on a total of twenty seven (self-reported and census derived ) context measures were gathered and will be considered in the study (see Appendix C for a complete list).
Scale Analysis

To evaluate the internal consistency of each of the ten scales, Cronbach alpha coefficients were determined since it is one of the most widely used measures of test score reliability (Pallant, 2007). For the three dimensions of sustainability, the respective Cronbach alpha values for the environmental, social, and economic scales were 0.795, 0.681, and 0.825. For the four organizational capacities, the respective Cronbach alpha coefficients for political, technical, financial, and managerial capacity scales were 0.854, 0.616, 0.672, and 0.856. For the three organizational strategies, the respective Cronbach alpha coefficients for the citizen engagement, non-citizen stakeholder, and technical strategy scales were 0.799, 0.785, and 0.792.

For the seven of the ten scales where the coefficient results were over 0.7, scale reliability is deemed adequate as most researchers establish 0.7 as the cut-off for acceptability while a value of 0.8 or higher is preferable (Pallant, 2007). However, three of the ten scales (technical capacity scale, financial capacity scale, and social sustainability scale) had Cronbach alpha coefficients ranging between 0.61 and 0.68. The first two of these three scales (technical and financial capacity) contained fewer than ten items each while the social sustainability scale consisted of eleven items. Since Cronbach alpha coefficients are highly sensitive to scale size, the mean inter-item correlation may be the more appropriate reliability statistic for smaller scales with an optimal range for this statistic being between 0.2 and 0.4 (Pallant, 2007). The mean inter-item correlations for the technical and financial capacity scales fell within this preferred range at 0.395 and 0.228, respectively, suggesting that their respective internal consistency is acceptable. The mean inter-item correlation for the social sustainability scale was slightly below the optimal range at 0.161. Item-total statistics indicate that removal of items from the scale would not
increase the Cronbach alpha. Since the social sustainability scale's alpha coefficient is relatively close to the acceptable cut-off (0.681) and no improvement is possible by removing any scale items, the decision was made to regard the social sustainability scale as having minimally adequate reliability.

Statistical Model

This study will adopt a structural equation model (SEM) to examine the relationships depicted in Figure 5. SEM is useful to evaluate hypothesized relationships hypothesized between exogenous and endogenous variables. In this study, due to the desire to be inclusive with respect to the significant number of indicators for each latent construct, a summative index was used for each scale. Cronbach's alpha will also be used to provide a measure of each scale's reliability. One of the inherent advantages of structural equation modeling is the ability to compare relative strengths of direct and indirect variable relationships (Wan, 2002). Path coefficients in the structural equation model can be interpreted as standardized regression coefficients (i.e., beta coefficients) and, consequently, provide an indication of the relative strength of each modeled relationship.

With respect to evaluating the overall model fit, the Chi square test, $\chi^2$, is the only available test statistic to support this type of evaluation. The null hypothesis of the $\chi^2$ test assumes that there is no difference between the hypothesized model and the data. Consequently, an insignificant outcome ($p > 0.05$) would tend to support good fit. With respect to having sufficient power, SEM typically has more demand for a larger sample size. While there are different perspectives on adequate sample size, this study (with 264 observations) exceeds the
critical sample size requirement of 200 for meaningful results recommended by Garver and Mentzer (1999) and Hoelter (1983). Since the Chi square test statistic is generally quite sensitive to sample size (i.e., it is increasingly difficult to get an insignificant test result for sample sizes larger than 200), final model evaluation will also rely on other measures of fit that exhibit less sample size sensitivity. These approaches to evaluating model fit include calculation of a $\chi^2$/d.f. ratio (dividing $\chi^2$ by the degrees of freedom), computing the root mean square error (RMSEA) index, and determining the comparative fit index (CFI). With respect to these different measures of fit, according to the literature, it is desirable to have a $\chi^2$/d.f. ratio < 3, a RMSEA index < 0.08, and a CFI > 0.90 to support acceptable model fit (i.e., the data supports the hypothesized model relationship) (Wan, 2002). It is very common to report multiple measures of model fit in SEM related studies. In many studies, due to its lack of sensitivity to sample size, RMSEA is increasingly being used as the preferred criterion where models that have an index measure less than 0.05 are considered to have good fit in contrast to models with index measures between 0.05 and 0.08 being deemed to have a lower relative level of acceptable fit.
Figure 6: Generic Structural Equation Model for Local Sustainability Management
CHAPTER FOUR: RESULTS

This chapter will present the key findings of the study. Descriptive information on the characteristics of the respondents will be discussed as well as summary measures of key variables. City demographic information is based on the 2009 American Community Survey since the 2010 Census information was not available for all of the variables at the time of analysis. Individual correlations between each of the model variables and the dependent variable of sustainability will also be examined. In preparation to perform structural equation modeling (SEM), the assumptions of multiple regression as well as multivariate normality will be tested. All individual variable relationships as well as model fit statistics will be evaluated for significance at the .05 level. With respect to the SEM, an original model will be initially tested that includes all hypothesized variable relationships. Subsequently, a revised model that includes only significant relationships will be evaluated. This approach will reveal how each of the independent and context variables in the study affect the implementation of local sustainability practices. In addition, the explained variance of each endogenous variable and the overall fit and explanatory power of the structural equation model will be assessed.

Descriptive Analysis

Respondent Characteristics

As depicted in Table 1, in terms of population, as expected, there was a significant amount of variation (SD = 332,557) among the respondents. While the sampling frame was
based on cities with populations of 50,000 or greater, as of the 2000 census, there were three respondent cities (Berwyn, IL; Sheboygan, WI; and Huntington, WV) that experienced a decline in population below 50,000 residents between the 2000 and 2009 period. The respondent city with the largest population was Los Angeles, CA. There were only four other respondent cities with 2009 populations over one million (Houston, Philadelphia, San Antonio, and Dallas). Due to the non-response of some higher density areas, the mean population density figure of 3,929 residents per square mile of the respondents was slightly lower (6%) than the U.S. average (4,166) for cities with populations over 50,000. Respondent characteristic variables in Table 1 among respondent cities which, respectively, exhibited higher averages than the U.S. in general were median household income ($53,052 versus $50,221), high school graduation percent (86.4% versus 85.3%), below poverty level percent (15.4% versus 14.3%), black percent (14.1% versus 12.4%), and the 2008 Presidential election democratic voting percent (58.4% versus 53%). In contrast, the respondent characteristic variables in Table 1 which depicted lower averages than the U.S. as a whole were manufacturing percent (9.8% versus 10.4%), median age (34.8 versus 36.8), and white percent (69.6% versus 74.8%).

While these differences may not appear substantial, they do seem to suggest that respondent cities, on average, were slightly less densely populated with a slightly lower manufacturing base, but slightly higher educated, slightly younger, slightly more racially diverse, and slightly more politically liberal than the U.S. as a whole.
Table 1: Responding Cities' Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>264</td>
<td>194,484</td>
<td>332,557</td>
<td>47,782</td>
<td>3,831,868</td>
</tr>
<tr>
<td>Population density</td>
<td>264</td>
<td>3,929</td>
<td>2,660</td>
<td>209</td>
<td>17,463</td>
</tr>
<tr>
<td>Manufacturing percent</td>
<td>264</td>
<td>9.8</td>
<td>5.1</td>
<td>1.5</td>
<td>41.1</td>
</tr>
<tr>
<td>Median age</td>
<td>264</td>
<td>34.8</td>
<td>4.4</td>
<td>22.1</td>
<td>52.9</td>
</tr>
<tr>
<td>White percent</td>
<td>264</td>
<td>69.6</td>
<td>15.9</td>
<td>16.7</td>
<td>94.4</td>
</tr>
<tr>
<td>Black percent</td>
<td>264</td>
<td>14.1</td>
<td>14.5</td>
<td>0.1</td>
<td>76.3</td>
</tr>
<tr>
<td>Median household income</td>
<td>264</td>
<td>53,052</td>
<td>17,910</td>
<td>24,525</td>
<td>119,483</td>
</tr>
<tr>
<td>Below poverty level percent</td>
<td>264</td>
<td>15.4</td>
<td>7.5</td>
<td>2.3</td>
<td>39.7</td>
</tr>
<tr>
<td>High school graduation percent</td>
<td>264</td>
<td>86.4</td>
<td>6.7</td>
<td>64.5</td>
<td>97.8</td>
</tr>
<tr>
<td>Democratic vote in 2008 Presidential election</td>
<td>264</td>
<td>58.4</td>
<td>12.2</td>
<td>19.0</td>
<td>89.0</td>
</tr>
</tbody>
</table>

Note. All data are from 2009 U.S. Census American Community Survey. Democratic vote percentage is for county of respondent city.

Local Sustainability Implementation

As reflected in Table 2, respondent cities, on average, reported implementing a third of the items in the sustainability index. Of the three dimensions (environmental, social, and economic), environmental sustainability initiatives were implemented to the greatest extent and accounted for approximately 44% of total reported sustainability practices for the average respondent. The average respondent reported implementing nearly 45% of the items on the environmental and social sustainability scales while implementing, on average, less than 20% of the items related to economic sustainability. This finding may suggest that sustainability continues to be predominately viewed by local practitioners as an environmental and social activity rather than a balanced pursuit across three dimensions. Notwithstanding this observation, there is also plenty of room for improvement with the environment and social dimensions of
With respect to environmental sustainability, nearly eighty percent of respondents reported practicing 10 or fewer of a total of 17 items. With respect to social sustainability, approximately three-fourths of the respondents reported practicing six or fewer of a total of 11 items.

Table 2: Sustainability Implementation

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Sustainability</td>
<td>264</td>
<td>7.5</td>
<td>3.8</td>
<td>0.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Social Sustainability</td>
<td>264</td>
<td>4.9</td>
<td>2.3</td>
<td>0.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Economic Sustainability</td>
<td>264</td>
<td>4.5</td>
<td>4.0</td>
<td>0.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Sustainability Index</td>
<td>264</td>
<td>16.9</td>
<td>8.9</td>
<td>1.0</td>
<td>46.0</td>
</tr>
</tbody>
</table>

*Note.* Environmental, social, and economic sustainability scales contained 17, 11, and 23 items, respectively. The composite Sustainability Index contained a total of 51 items.

With respect to the sustainability index, all cities reported implementing at least one sustainability practice in the index. A total of 93.6% of respondent cities reported implementing six or more sustainability practices. A total of 12 sustainability practices were implemented by 50% or more of the respondent cities. Three of these local sustainability practices (i.e., promoting bicycle use, monitoring water quality, and water conservation education) were items in the social sustainability scale while only one was from the economic sustainability scale. The remaining eight or the majority of the most common practices were in the environmental sustainability scale. Figure 7 reflects all of the sustainability practices that were implemented by at least half of the respondent cities. In contrast, Figure 8 reflects the sustainability practices that were implemented with the least frequency. Thirteen of the fifteen practices with sustainability implementation rates lower than 20% were economic related sustainability practices.
Consistent with the Saha and Paterson study (2008), with respect to implementation efforts, respondent cities have focused primarily on the environmental dimension of sustainability. Notwithstanding this similar focus, compared to the Saha and Paterson study (2008), the level of sustainability activity adoption observed in this research was generally lower across most comparable items. The low adoption rate could be partially attributable to the smaller sampling frame used in the Saha and Paterson (2008) study which included localities with population of 75,000 or higher. Areas where this research reported lower adoption rates included protection of environmentally sensitive lands (50% versus 73%), brownfield redevelopment (28% versus 65%), and community environmental education (34% versus 73%). In contrast, a couple areas where higher adoption rates were observed in this study included renewable energy use by city (52% versus 30%) and green building standards (36% versus 30%).

![Local Sustainability Practices](image)

**Figure 7**: Local Sustainability Practices Implemented by 50% or More Respondents
Local Sustainability Practices
To practice sustainability, our city has...

- Property tax credits for LEED buildings: 18%
- Created green collar jobs taskforce: 16%
- Expedited alternative energy permit process: 16%
- Fee reductions for LEED certification: 16%
- Identified green collar goals: 14%
- Density bonus for LEED buildings: 13%
- Created green economic development plan: 13%
- Promoted green location decisions: 11%
- Energy efficiency incentives for businesses: 10%
- Created green-collar jobs taskforce: 8%
- Expedited processing and fee waivers: 6%
- Green collar workforce training assistance: 5%

Figure 8: Local Sustainability Practices Implemented by 20% or Fewer Respondents

Organizational Capacity Usage

Respondent cities reported, on average, using approximately 45% of the total 32 capacity items across the four organizational capacities examined in this study. As shown in Table 3, political capacity was the most utilized organizational capacity followed closely behind by technical capacity. Managerial and financial capacity reported considerably lower levels of use.
Table 3: Organizational Capacities Used To Advance Sustainability

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political Capacity</td>
<td>264</td>
<td>5.7</td>
<td>3.1</td>
<td>0.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Technical Capacity</td>
<td>264</td>
<td>2.1</td>
<td>1.5</td>
<td>0.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Financial Capacity</td>
<td>264</td>
<td>2.2</td>
<td>1.6</td>
<td>0.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Managerial Capacity</td>
<td>264</td>
<td>4.3</td>
<td>3.4</td>
<td>0.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

*Note.* Political, technical, financial, and managerial capacity scales contained 10, 4, 7, and 11 items, respectively.

On average, cities reported using 56.5% of the items on the political capacity scale. The political capacity items that exhibited the most use were obtaining support from department heads (86.7%), obtaining support from the mayor's office (86.3%), obtaining support from the city manager's office (76.9%), obtaining support from most managers (67.4%), and obtaining support from agencies in other governments (56.4%). The political capacities that were used less frequently were obtaining support from most employees in the city (49.6%), obtaining support from most citizens of the city (43.9%), and obtaining support from non-profits or other stakeholders (15.9%). This finding suggests that cities in terms of garnering political support for local sustainability implementation are employing a primarily top down approach.

In terms of technical capacity, respondent cities reported having support for 52.5% of the items in the scale. There were very similar rates of use among the four individual items in the technical capacity scale. Technical capacity item use among respondent cities ranged from a high of 55% for having city staff capable of using green technology to a low of 50% for utilization of private consultants specializing in green technologies with the other two items falling in the middle of this narrow range.
Managerial capacity was not as well developed among respondent cities. On average, respondent cities implemented nearly 40% of the items in the management capacity scale. The management capacity items with the highest implementation frequencies were incorporating sustainability principles into city department operations (56.1%), incorporating sustainability principles into city government's comprehensive plan (53.4%), and designating an individual to coordinate the city's sustainability initiatives (53%). Each of the remaining nine items in the management capacity scale were implemented by fewer than half of the respondent cities. The management capacity items with the lowest application levels were developing performance measures to evaluate city's sustainability initiatives (34.5%), evaluating the performances of city's sustainability initiatives (26.9%), and improving performances of city's sustainability initiatives based on performance evaluation (16.7%).

Financial capacity was the least cultivated organizational capacity of those studied with, on average, only 31% of items in the scale being placed into effect. Respondent cities reported a relatively high use of grants for sustainability initiatives (71.2%). Approximately half of the respondent cities also indicated that they had funded sustainability related capital projects (50.4%) but only 43.5% reported that the city regularly budgeted for sustainability initiatives. Fiscal pressures may also be making it difficult for cities to maintain sustainability related funding levels with only one in four (25.7%) reporting the ability to do so. There was also a clear reluctance to make longer term debt commitments for financing sustainability projects (11.3%) or to offer tax incentives for either carbon reducing technologies (8.3%) or developing green properties (6.4%).
Organizational Strategies Pursued

As depicted in Table 4, of the three types of strategies considered in this study, the employment of technical strategies was most common. On average, respondent cities used slightly more than half of the items (51.7%) included in the technical strategy scale. Four of the five technical strategies were used by more than half of the respondents with the most popular technical strategy being actively seeking best practices information from other governments (64.8%). The least used technical strategy was actively seeking technical expertise of universities and research institutions (37.5%).

As a whole, citizen engagement strategies were used substantially less by the respondent cities. On average, only 34.6% of the 11 items in the citizen engagement strategies scale were reportedly utilized. Only three of the 11 citizen engagement strategies were used by more than half of the respondent cities. These were information provision activities (62.5%), citizen boards and commissions (52.7%), and focusing on getting citizen support for sustainability efforts (50.4%). Specified citizen engagement strategies that were used the least were citizen surveys (33%), consensus building workshops (19.7%), and conflict resolution techniques and mediation roundtable discussions (2.3%).

This study also explored the use of five non-citizen stakeholder strategies. Respondent cities that utilized these non-citizen stakeholder strategies were most likely to have an inward orientation with involving city management (57.6%) and city employees (51.5%) in crafting a sustainable version of the city being the only two non-citizen stakeholder strategies that were practiced by more than half of the respondents. Strategies that sought to involve external
stakeholders such as businesses (34.5%) or non-profits (9.1%) were employed with a much lower rate of frequency.

Table 4: Organizational Strategies Pursued to Improve Capacity

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citizen Engagement Strategies</td>
<td>264</td>
<td>3.8</td>
<td>2.8</td>
<td>0.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Non-Citizen Stakeholder Strategies</td>
<td>264</td>
<td>1.9</td>
<td>1.7</td>
<td>0.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Technical Strategies</td>
<td>264</td>
<td>2.6</td>
<td>1.8</td>
<td>0.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

*Note.* Citizen engagement, non-citizen stakeholder, and technical strategy scales contained 11, 5, and 5 items, respectively.

Context Variables

This study also considered multiple other self-reported context variables. Nearly 70% of respondent cities reported that economic development and growth was the top priority while a majority of respondents also reported public safety as a top priority (56.8%) with crime being cited as a major concern for 27.6%.

As might be expected, many cities reported the lack of available financial resources for new programs and initiatives (55.3%). Consistent with this finding, approximately 45% of cities reported more than a 10% decline in city revenues during the past three years. A similar percentage (43.9%) of cities reported a significant loss of employment during the same period. Financial incentives from state government were reported as an influencing factor for sustainability actions by 45.8%.

In terms of state level support, only 18.9% and 27.3%, respectively, reported that state procedural requirements facilitated the adoption of sustainability initiatives and that organization
of sustainability initiatives (e.g., dedicated departments or specialized programs) at the state level influenced local sustainability actions. Of those that responded, the state's general approach to sustainability was described as 'hands off' by 36.5%, 'coercive' by 23%, and 'incentive and inducement' based by 40.4%. Approximately 21% of the respondent cities were from states that have enacted statewide planning legislation to help manage growth.

Virtually all (97.3%) of the respondents indicated they were very familiar (73.2%) or familiar (24.1%) with the sustainability activities of the city. The vast majority of respondents (75%) reportedly held high level positions in their respective city government including City Manager, Chief Executive Officer, or Chief Administration Officer (39.8%), Sustainability Manager, (28%), or Planning Director (7.2%). Approximately two-thirds (66.3%) of respondents reported the form of government as council-manager with the mayor-council form be applicable to 30.7%. With respect to political orientation, approximately 23% of respondent cities reported that a majority of city residents and city elected officials tended to be politically liberal or progressive.

Perceived Outcomes of Sustainability

While the focus of this study is on factors that may contribute to the implementation of sustainability activities and not on outcomes, self reported measures of outcomes were collected and are summarized in Figure 9.
Summary of Descriptive Analysis

With respect to sustainability implementation efforts, cities are focusing most of their attention on the environmental and social dimensions of sustainability. Based on the sustainability index used in this study, only a modest adoption rate (about 33%) of sustainability activities was observed. The lack of emphasis on the economic dimension may suggest that...
many cities do not see sustainability initiatives as drivers of economic growth since nearly seventy percent of cities reported economic development and growth as a top priority. This is not surprising given the severity and continuing after effects of the Great Recession of 2007. Responses to financial slack related questions reveal that many cities have recently experienced considerable amount of fiscal stress making it a challenging time for new programs and initiatives. Intergovernmental support for sustainability efforts from the state level also appears to be relatively weak. Consequently, cities are relying primarily on political and technical organizational capacities to facilitate their sustainability efforts. Managerial and financial capacities appear to have considerable room for development. This finding supports the perception that sustainability implementation in most cities remains at a relatively early stage of deployment. Cities are also currently employing predominately inwardly focused expert-driven technical strategies to build organizational capacities. The findings reveal that outwardly focused citizen engagement strategies or non-citizen stakeholder strategies associated with businesses are not in widespread use. Self-reported measures on perceived outcomes present an encouraging blend of increased city employee and public awareness, monetary savings, environmental protection, pollution reduction, and quality of life improvements.

**Correlation Results: Sustainability Dimensions**

To assess the strength and direction of the relationship between the various dimensions of the dependent variable of sustainability and the sustainability index, Pearson's correlation coefficient was calculated for each of the items in the three dimensions of sustainability.
Environmental Sustainability

As seen in Table 5, the environmental dimension of the sustainability index exhibited a strong significant (p < .01) positive correlation (r = .91) with the aggregate sustainability index. All individual items of the environmental dimension also had a positive statistically significant correlation (p < .01) with the sustainability index. Nearly a third of the individual environmental dimension items had correlations with the sustainability index that was equal or exceeded r = .50. The strongest individual item correlation with the composite sustainability index for the environmental dimension was a city that 'adopted a green standard as official minimum criteria for new government buildings' (r = .55). Notwithstanding, this particular item was only reportedly practiced by 35.6% of respondent cities. In fact, only one of the more strongly correlated (r = .52) environmental dimension items (i.e. become a member of sustainability group) was practiced by a majority of respondents (61.1%). In contrast, the weakest individual item correlation with the composite sustainability index for the environmental dimension was 'implemented a program that systematically conserves or plants trees' (r = .30). Perhaps surprisingly, this latter item was the environmental dimension sustainability activity with the highest implementation rate among respondent cities (78%). A common theme with the individual environmental dimension items that had the stronger correlations with the sustainability index is that they involved education, developing standards, or becoming affiliated with others that were pursuing sustainability.
Table 5: Environmental Dimension of Sustainability

<table>
<thead>
<tr>
<th>Environmental Sustainability Practices</th>
<th>Action Taken %</th>
<th>Correlation with SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented a program that systematically conserves or plants trees</td>
<td>78.0%</td>
<td>0.30**</td>
</tr>
<tr>
<td>Purchased alternative fuel vehicles for city business</td>
<td>77.7%</td>
<td>0.35**</td>
</tr>
<tr>
<td>Become a member of a sustainability group (e.g., US Green Building Council)</td>
<td>61.1%</td>
<td>0.52**</td>
</tr>
<tr>
<td>Constructed new building based on LEED standards</td>
<td>59.5%</td>
<td>0.43**</td>
</tr>
<tr>
<td>Operated a website dedicated to green city programs</td>
<td>53.4%</td>
<td>0.49**</td>
</tr>
<tr>
<td>Used renewable energy (solar, wind, geothermal heat etc.) in city departments’ operations</td>
<td>51.9%</td>
<td>0.48**</td>
</tr>
<tr>
<td>Purchased and protected environmentally sensitive lands</td>
<td>49.6%</td>
<td>0.39**</td>
</tr>
<tr>
<td>Adopted green cleaning and maintenance procedures</td>
<td>44.7%</td>
<td>0.44**</td>
</tr>
<tr>
<td>Offered energy audits to citizens, business, and community stakeholders</td>
<td>36.7%</td>
<td>0.38**</td>
</tr>
<tr>
<td>Adopted a green standard as official minimum criteria for new government buildings</td>
<td>35.6%</td>
<td>0.55**</td>
</tr>
<tr>
<td>Offered green technology education classes or workshops to the community</td>
<td>34.1%</td>
<td>0.51**</td>
</tr>
<tr>
<td>Developed an environmentally preferable purchasing program</td>
<td>31.8%</td>
<td>0.50**</td>
</tr>
<tr>
<td>Utilized LEED or Commercial Interiors (CI) specifications to renovate existing buildings</td>
<td>29.9%</td>
<td>0.44**</td>
</tr>
<tr>
<td>Offered green technology education classes or workshops to employees</td>
<td>29.9%</td>
<td>0.53**</td>
</tr>
<tr>
<td>Posted air quality index or/and water quality testing results on city website</td>
<td>29.5%</td>
<td>0.32**</td>
</tr>
<tr>
<td>Adopted green landscaping ordinance for local government buildings</td>
<td>24.2%</td>
<td>0.34**</td>
</tr>
<tr>
<td>Offered renewable energy (solar, wind, geothermal heat etc.) to citizens or customers</td>
<td>18.6%</td>
<td>0.44**</td>
</tr>
<tr>
<td><strong>Environmental Sustainability Average Measure</strong></td>
<td>43.9%</td>
<td>0.91**</td>
</tr>
</tbody>
</table>

Note. ** Significant at the 0.01 level

Social Sustainability

The social dimension of the sustainability index (Table 6) displayed a significant (p < .01) positive correlation (r = .79) with the aggregate sustainability index. All individual items of the social dimension also had a positive statistically significant correlation (p < .01) with the sustainability index. Only one item of the social dimension, 'offered incentives for construction of affordable housing' produced a correlation (r = .51) with the sustainability index that was larger than r = .50. This action, however, was only reportedly taken by 18.6% of respondent cities. Compared to the other two dimensions of sustainability, the individual items in the social dimension had weaker individual correlations with the sustainability index.
Economic Sustainability

The economic dimension of sustainability, with 23 individual items, was the largest of the three dimensions of sustainability. The economic dimension of the sustainability index (Table 7) displayed a significant (p < .01) positive correlation (r =.90) with the aggregate sustainability index. All individual items of the economic dimension also had a positive statistically significant correlation (p < .01) with the sustainability index. The economic dimension had the widest range in individual correlation measures. The individual action item in the economic dimension with the strongest correlation (r =.62) with the sustainability index was 'built partnerships with the business community to achieve sustainability goals' while the economic dimension action item with the weakest correlation (r = .14) with the sustainability index was providing a 'property tax credit to any commercial building that achieves LEED certification'. While exhibiting a strong aggregate correlation measure (r = .90), the economic
dimension was by far the least implemented of the three dimensions of sustainability with an
average implementation rate of 19.5%. This finding further supports prior research that many
cities do not view sustainability as an economically connected initiative (Saha and Paterson,
2008).

Table 7: Economic Dimension of Sustainability

<table>
<thead>
<tr>
<th>Economic Sustainability Practices</th>
<th>Action Taken %</th>
<th>Correlation with SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented “Buy Local” campaigns</td>
<td>49.6%</td>
<td>0.28**</td>
</tr>
<tr>
<td>Built partnerships with the business community to achieve sustainability goals</td>
<td>49.2%</td>
<td>0.62**</td>
</tr>
<tr>
<td>Linked environmental goals to publicly-financed incentive packages</td>
<td>28.0%</td>
<td>0.49**</td>
</tr>
<tr>
<td>Established a brownfields redevelopment fund</td>
<td>27.7%</td>
<td>0.26**</td>
</tr>
<tr>
<td>Created demand for green products through public procurement policies</td>
<td>25.4%</td>
<td>0.51**</td>
</tr>
<tr>
<td>Zoning or regulations that allow for onsite renewable energy systems for businesses</td>
<td>25.4%</td>
<td>0.36**</td>
</tr>
<tr>
<td>Residential green building checklist</td>
<td>23.5%</td>
<td>0.52**</td>
</tr>
<tr>
<td>Developed policies to create and strengthen markets for green goods and services</td>
<td>23.1%</td>
<td>0.55**</td>
</tr>
<tr>
<td>Provide low interest loans for energy efficiency measures and building materials</td>
<td>22.7%</td>
<td>0.38**</td>
</tr>
<tr>
<td>Built capacity to “green” existing business processes</td>
<td>20.5%</td>
<td>0.60**</td>
</tr>
<tr>
<td>Provided a green-collar workforce training assistance</td>
<td>17.8%</td>
<td>0.47**</td>
</tr>
<tr>
<td>Priority permitting and fee waivers for installation of green technologies</td>
<td>16.3%</td>
<td>0.37**</td>
</tr>
<tr>
<td>Publicly committed to a green-collar jobs strategy</td>
<td>15.9%</td>
<td>0.49**</td>
</tr>
<tr>
<td>Designated locations for alternative energy generation, R&amp;D, or manufacturing</td>
<td>15.5%</td>
<td>0.39**</td>
</tr>
<tr>
<td>Promoted greening location decisions</td>
<td>14.0%</td>
<td>0.37**</td>
</tr>
<tr>
<td>Created a Green Economic Development Plan document</td>
<td>13.3%</td>
<td>0.35**</td>
</tr>
<tr>
<td>Incentives that lower financial barriers to energy efficiency gains by businesses</td>
<td>13.3%</td>
<td>0.47**</td>
</tr>
<tr>
<td>Density bonus for buildings achieving LEED certification</td>
<td>10.6%</td>
<td>0.29**</td>
</tr>
<tr>
<td>Identified green-collar goals and assessed existing local opportunities</td>
<td>10.2%</td>
<td>0.46**</td>
</tr>
<tr>
<td>Fee reductions to cover the cost of LEED certification</td>
<td>7.6%</td>
<td>0.30**</td>
</tr>
<tr>
<td>Expedited application and permit process for alternative energy facilities</td>
<td>7.6%</td>
<td>0.26**</td>
</tr>
<tr>
<td>Created a green-collar jobs taskforce</td>
<td>6.1%</td>
<td>0.30**</td>
</tr>
<tr>
<td>Property tax credit to any commercial building that achieves LEED certification</td>
<td>4.6%</td>
<td>0.14*</td>
</tr>
</tbody>
</table>

**Economic Sustainability Average Measure**

19.5% 0.90**

Note. ** Significant at the 0.01 level

Correlation Results: Organizational Capacities

To assess the strength and direction of the relationship between the four organizational
capacities in the study and the composite index of sustainability consisting of all three
dimensions, Pearson's correlation coefficient was calculated for each of the items in the four organizational capacity scales.

Political Capacity

As reflected in Table 8, the political capacity variable exhibited a significant positive correlation (p < 0.01) of r = .53 with the sustainability index. All of the individual items in the political capacity scale had a statistically significant positive relationship with the sustainability index. Among these, the strongest relationship was support from 'local business leaders of the city' (r = .51) while the weakest was support from 'nonprofits or other stakeholders' (r = .22). It is interesting to note that while cities appear to be focusing more on garnering internal support from higher levels such as department heads (r = 0.30) and Mayors (r = .25) these items are not as strongly correlated with the sustainability index as support from local business leaders (r = .51), agencies in other governments (r = .44), and local citizens (r = .38).
Table 8: Political Capacity for Sustainability

<table>
<thead>
<tr>
<th>Political Support: &quot;Our sustainability efforts have support from...&quot;</th>
<th>Action Taken (%)</th>
<th>Correlation with SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most department heads in the city</td>
<td>86.7%</td>
<td>0.30**</td>
</tr>
<tr>
<td>The Mayor’s office</td>
<td>86.4%</td>
<td>0.25**</td>
</tr>
<tr>
<td>Most managers in the city</td>
<td>67.4%</td>
<td>0.40**</td>
</tr>
<tr>
<td>Agencies in other governments</td>
<td>56.4%</td>
<td>0.44**</td>
</tr>
<tr>
<td>Most supervisors in the city</td>
<td>54.6%</td>
<td>0.29**</td>
</tr>
<tr>
<td>Most legislators in the city</td>
<td>53.4%</td>
<td>0.34**</td>
</tr>
<tr>
<td>Local business leaders of the city</td>
<td>50.4%</td>
<td>0.51**</td>
</tr>
<tr>
<td>Most employees in the city</td>
<td>49.6%</td>
<td>0.30**</td>
</tr>
<tr>
<td>Most citizens of the city</td>
<td>43.9%</td>
<td>0.38**</td>
</tr>
<tr>
<td>Nonprofits or other stakeholders</td>
<td>15.9%</td>
<td>0.22**</td>
</tr>
<tr>
<td><strong>Political Capacity Average Measure</strong></td>
<td>56.5%</td>
<td>0.53**</td>
</tr>
</tbody>
</table>

Note. ** Significant at the 0.01 level

Technical Capacity

Among the technical capacity scale items, as indicated in Table 9, all scale items had significant positive correlations (p < .01) with the sustainability index. While cities' technical capacity use varied within a tight range (between 50 and 58%), the correlations for the technical capacity scale items exhibited a wider range (between r = .29 and r = .53). As a whole, the composite technical capacity index had a statistically significant positive correlation of r = .56 with the sustainability index. The correlation between support from 'professional institutions of green initiatives such as USGBC and ICLEI' and the sustainability index was the strongest observed (r = .53) while the correlation between support from 'city staff capable of using the green technology' and the sustainability index was the weakest (r = .29). The latter finding is noteworthy since cities' use of this capacity item was the highest among all scale items despite it having the lowest correlation with the sustainability index.
Table 9: Technical Capacity for Sustainability

<table>
<thead>
<tr>
<th>Technical Support: &quot;Our sustainability efforts have support from...&quot;</th>
<th>Action Taken %</th>
<th>Correlation with SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>City staff capable of using the green technology</td>
<td>58.0%</td>
<td>0.29**</td>
</tr>
<tr>
<td>Professional institutions of green initiatives such as USGBC and ICLEI</td>
<td>53.8%</td>
<td>0.53**</td>
</tr>
<tr>
<td>Universities or research communities specialized in green technologies or strategies</td>
<td>50.8%</td>
<td>0.41**</td>
</tr>
<tr>
<td>Private consultants specialized in green technologies or strategies</td>
<td>50.0%</td>
<td>0.36**</td>
</tr>
<tr>
<td>Technical Capacity Average Measure</td>
<td>53.1%</td>
<td>0.56**</td>
</tr>
</tbody>
</table>

Note. ** Significant at the 0.01 level

Financial Capacity

As a composite index, the financial capacity scale, as exhibited in Table 10, had the second highest significant positive correlation (r = .65, p < .01) with the sustainability index among the four studied organizational capacities. The individual scale items were all statistically significant (p < .01) with a correlation range between a high of r = .52 for 'budgeted for the government's sustainability initiatives' and a low of r = .29 for 'applied grants to finance sustainability initiatives'. While over 71% of cities reported the use of grant financing, this particular scale item had the lowest correlation with the sustainability index (r = .29). Similarly, while less than half of cities (43.6%) reported budgeting for sustainability activities, this scale item had highest correlation with the sustainability index (r = .52) of all financial capacity scale items. Two other operating and capital budget related scale items, 'maintained the funding level for sustainability activities' and 'funded capital projects related to sustainability initiatives' also exhibited relatively higher correlations (r = .44) with the sustainability index among the seven financial capacity scale items.
Table 10: Financial Capacity for Sustainability

<table>
<thead>
<tr>
<th>Financial Resources: &quot;Our city has...&quot;</th>
<th>Action Taken %</th>
<th>Correlation with SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied grants to finance sustainability initiatives</td>
<td>71.2%</td>
<td>0.29**</td>
</tr>
<tr>
<td>Funded capital projects related to sustainability initiatives</td>
<td>50.4%</td>
<td>0.44**</td>
</tr>
<tr>
<td>Budgeted for the city government’s sustainability initiatives</td>
<td>43.6%</td>
<td>0.52**</td>
</tr>
<tr>
<td>Maintained the funding level for the city’s sustainability activities</td>
<td>25.8%</td>
<td>0.44**</td>
</tr>
<tr>
<td>Issued debts to finance sustainability initiatives</td>
<td>11.4%</td>
<td>0.26**</td>
</tr>
<tr>
<td>Offered tax (or financial) incentives for the residential or commercial use of carbon-reducing technologies</td>
<td>8.3%</td>
<td>0.32**</td>
</tr>
<tr>
<td>Offered tax (or financial) incentives for developing or redeveloping green properties</td>
<td>6.4%</td>
<td>0.34**</td>
</tr>
</tbody>
</table>

Financial Capacity Average Measure 31.0% 0.65**

Note. ** Significant at the 0.01 level

Managerial Capacity

As reflected in Table 11, the managerial capacity scale exhibited the strongest significant positive correlation (r = .71, p < .01) among all the organizational capacities examined in this study. Notwithstanding the scale's high correlation with the sustainability index, only 38.9% of respondent cities, on average, reported putting into practice management capacity scale items.

All individual items included in the scale displayed a statistically significant positive correlation (p < .01). The positive correlations ranged between a high of r = .53 for 'monitored and tracked the performance of city's sustainability initiatives' to a low of r = .37 for 'incorporated sustainability principles into city government's comprehensive plan'. There were multiple scale items within the management capacity scale that despite having high correlations with the sustainability index were implemented at relatively low levels. Three such items in the managerial capacity scale were 'developed performance measures to evaluate city's sustainability initiatives', 'evaluated the performances of city's sustainability initiatives', and 'improved
performances of city's sustainability initiatives based on performance evaluation' with respective implementation rates of 34.5%, 26.9%, and 16.7% and corresponding correlations with the sustainability index of either $r = .50$ or $r = .51$.

Table 11: Managerial Capacity for Sustainability

<table>
<thead>
<tr>
<th>Managerial Execution: &quot;Our city has...&quot;</th>
<th>Action Taken %</th>
<th>Correlation with SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporated sustainability principles in city departments’ operations</td>
<td>56.1%</td>
<td>0.48**</td>
</tr>
<tr>
<td>Incorporated sustainability principles into city government’s comprehensive plan</td>
<td>53.4%</td>
<td>0.37**</td>
</tr>
<tr>
<td>Incorporated sustainability principles into city government’s strategic plan</td>
<td>45.5%</td>
<td>0.46**</td>
</tr>
<tr>
<td>Included commitments for sustainability in the city’s goal or mission statement</td>
<td>42.1%</td>
<td>0.44**</td>
</tr>
<tr>
<td>Convened city-wide meetings to discuss commitments for sustainability for past 12 months</td>
<td>41.3%</td>
<td>0.40**</td>
</tr>
<tr>
<td>Monitored and tracked the performances of city’s sustainability initiatives</td>
<td>38.3%</td>
<td>0.53**</td>
</tr>
<tr>
<td>Designated an office to coordinate city’s sustainability initiatives</td>
<td>37.9%</td>
<td>0.50**</td>
</tr>
<tr>
<td>Developed a city-wide sustainability plan</td>
<td>35.6%</td>
<td>0.36**</td>
</tr>
<tr>
<td>Developed performance measures to evaluate city’s sustainability initiatives</td>
<td>34.5%</td>
<td>0.51**</td>
</tr>
<tr>
<td>Evaluated the performances of city’s sustainability initiatives</td>
<td>26.9%</td>
<td>0.51**</td>
</tr>
<tr>
<td>Improved performances of city’s sustainability initiatives based on performance evaluation</td>
<td>16.7%</td>
<td>0.50**</td>
</tr>
<tr>
<td>Management Capacity Average Measure</td>
<td>38.9%</td>
<td>0.71**</td>
</tr>
</tbody>
</table>

Note. ** Significant at the 0.01 level

Correlation Results: Organizational Strategies

To assess the strength and direction of the relationship between the three organizational strategies in the study and a composite capacity index consisting of all four organizational capacities considered, Pearson's correlation coefficient was calculated for each of the items in the three organizational strategy scales. All three organizational strategies (citizen engagement strategies, non-citizen engagement strategies, and technical strategies) had statistical significant positive correlations ($p < .01$) with this capacity index.
Citizen Engagement Strategies

Of the three organizational strategies studied, citizen engagement strategies (Table 12) had the strongest positive correlation ($r = .72$). Within the citizen engagement scale, two of the strongest item correlations, using 'information provision activities' ($r = .50$) and 'citizen boards and commissions' ($r = .54$) also had relatively high rates of implementation with 62.5% and 52.7%, respectively, of the respondent cities employing these two strategies. However, one scale item, 'frequently explaining the results of sustainability efforts to citizens' had the second highest item correlation ($r = .53$) but was only reportedly used by 37.1% of respondents. As a whole, despite the citizen engagement scale's reasonably high level of correlation ($r = .72$) with organizational capacities, the particular strategies in the citizen engagement scale were reportedly, on average, not used by nearly two-thirds of respondents cities.

Table 12: Citizen Engagement Strategies to Improve Capacity

<table>
<thead>
<tr>
<th>Engaging Citizens: &quot;To engage citizens in sustainability, our city has...&quot;</th>
<th>Action Taken %</th>
<th>Correlation with Capacities¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information provision activities (e.g., newspaper articles, web-based announcements)</td>
<td>62.5%</td>
<td>0.50**</td>
</tr>
<tr>
<td>Citizen boards and commissions</td>
<td>52.7%</td>
<td>0.54**</td>
</tr>
<tr>
<td>Focused on getting citizens' support in our sustainability efforts</td>
<td>50.4%</td>
<td>0.49**</td>
</tr>
<tr>
<td>Local neighborhood organizations</td>
<td>40.5%</td>
<td>0.43**</td>
</tr>
<tr>
<td>Chambers of commerce</td>
<td>38.3%</td>
<td>0.45**</td>
</tr>
<tr>
<td>Frequently explained the results of sustainability efforts to citizens</td>
<td>37.1%</td>
<td>0.53**</td>
</tr>
<tr>
<td>Community visioning workshops</td>
<td>34.9%</td>
<td>0.39**</td>
</tr>
<tr>
<td>Citizen surveys</td>
<td>33.0%</td>
<td>0.32**</td>
</tr>
<tr>
<td>Consensus building workshops</td>
<td>19.7%</td>
<td>0.33**</td>
</tr>
<tr>
<td>Other citizen initiatives</td>
<td>9.5%</td>
<td>0.28**</td>
</tr>
<tr>
<td>Conflict resolution techniques and mediation roundtable discussions</td>
<td>2.3%</td>
<td>0.27**</td>
</tr>
<tr>
<td><strong>Citizen Engagement Strategy Average Measure</strong></td>
<td>34.6%</td>
<td>0.72**</td>
</tr>
</tbody>
</table>

Note. 1. All associations shown are with composite index of four capacities. ** Significant at the 0.01 level.
Non-Citizen Stakeholder Strategies

In total, as indicated in Table 13, the non-citizen stakeholder strategy index had a statistically positive correlation (p <.01) of r = .69 with organizational capacities. Four of the specific strategies in this scale displayed correlations ranging between r = .51 and r = .57. While the majority of respondent cities did indicate that they 'involved city management (57.6%) and city employees (51.5%) in crafting a sustainable version of the city', far fewer reported that they 'involved city legislators (40.2%) and business groups (34.5%) in crafting a sustainability version of city'. This latter finding was despite the latter two strategies exhibiting among the strongest non-citizen stakeholder strategy correlations (r = .51 and r = .55, respectively) with the development of organizational capacities.

Table 13: Non-citizen Stakeholder Strategies to Improve Capacity

<table>
<thead>
<tr>
<th>Involving non-Citizen Stakeholders: &quot;Our city has...&quot;</th>
<th>Action Taken %</th>
<th>Correlation with Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involved city management in crafting a sustainable version of the city</td>
<td>57.6%</td>
<td>0.55**</td>
</tr>
<tr>
<td>Involved city employees in crafting a sustainable version of the city</td>
<td>51.5%</td>
<td>0.57**</td>
</tr>
<tr>
<td>Involved city legislators in crafting a sustainable version of the city</td>
<td>40.2%</td>
<td>0.51**</td>
</tr>
<tr>
<td>Involved business groups in developing a sustainable version of the city</td>
<td>34.5%</td>
<td>0.55**</td>
</tr>
<tr>
<td>Involve nonprofits or other stakeholders in crafting a sustainable version of the city</td>
<td>9.1%</td>
<td>0.32**</td>
</tr>
<tr>
<td>Non-Citizen Stakeholder Strategy Average Measure</td>
<td>38.6%</td>
<td>0.69**</td>
</tr>
</tbody>
</table>

Note. 1. All associations shown are with composite index of four capacities. ** Significant at the 0.01 level.

Technical Strategies

As a whole, as indicated in Table 14, the technical strategies index had a statistically positive correlation (p <.01) of r = .70 with organizational capacities. Each of the correlations for the individual items in the index were also significant (p < .01). The strongest correlation with organizational capacities of any particular item in the technical strategies index was 'actively
[seeking] technical expertise of consulting firms' with a $r = .59$. Three of the remaining four remaining items in the index had correlations with organizational capacities within a tight range of $r = .53$ to $r = .57$ and these strategies were being practiced, on average, by 50% or more of respondent cities. Of all the items in the technical strategies index, the weakest correlation and implementation rate was 'actively [seeking] technical expertise of universities and research institutions ($r = .45$). This finding may suggest that sustainability related organizational research at universities and research institutions may need to become more implementation oriented to promote higher level of perceived benefits and, consequently, more widespread use.

Table 14: Technical Strategies to Improve Capacity

<table>
<thead>
<tr>
<th>Action</th>
<th>Taken %</th>
<th>Correlation with Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actively sought best practices information from other governments</td>
<td>64.8%</td>
<td>0.55**</td>
</tr>
<tr>
<td>Developed the technical expertise of our own staff in sustainability efforts</td>
<td>55.7%</td>
<td>0.53**</td>
</tr>
<tr>
<td>Actively sought expertise of professional organizations such as USGBC or ICLEI</td>
<td>50.4%</td>
<td>0.57**</td>
</tr>
<tr>
<td>Actively sought technical expertise of consulting firms</td>
<td>50.0%</td>
<td>0.59**</td>
</tr>
<tr>
<td>Actively sought technical expertise of universities and research institutions</td>
<td>37.5%</td>
<td>0.45**</td>
</tr>
<tr>
<td><strong>Technical Strategy Average Measure</strong></td>
<td>51.7%</td>
<td>0.70**</td>
</tr>
</tbody>
</table>

Note. 1. All associations shown are with composite index of four capacities. ** Significant at the 0.01 level.

**Correlation Results: Conclusion**

The three dimensions of sustainability (environmental, social, and economic) are each individually highly correlated with the sustainability index with respective correlations of $r = .91$, $r = .79$, and $r = .90$. However, high correlations with the sustainability index were, in many instances, matched with low average rates of implementation. For example, as a whole, the economic dimension of sustainability with a strong correlation of $r = .90$ with the sustainability index had an average implementation rate among respondent cities of less than 20%.
Alternatively, the sustainability dimension that had the lowest correlation (r = .79) with sustainability index, the social dimension, achieved the highest average rate of implementation at 44.8%. These findings suggest that there may remain considerable room for improvement not only in terms of implementing sustainability related activities but also in terms of allocating resources towards the most productive sustainability activities that are most likely to have the greatest impact on advancing local sustainability.

With regards to organizational capacities, managerial (r = .71), financial (r = .65), technical (r = .56), and political (r = .53) capacities had the highest respective correlations with the sustainability index. The only two organizational capacities reporting use by the majority of respondents were political (56.5%) and technical (53.1%) capacities. The two organizational capacities that had the strongest correlations with the sustainability index, managerial and financial, were, on average, undertaken by only 38.9% and 31.0% of respondents, respectively. Here again, this disparity appears to confirm that most cities remain in the early stages of building capacity for sustainability with a relatively small minority indicating that they are focusing on the critical organizational capacities related to the development of financial support mechanisms and managerial execution capabilities.

The three organizational strategies examined, citizen engagement strategies (r = .72), non-citizen stakeholder strategies (r = .69), and technical strategies (r = .70) all had relatively similar correlations with the development of organizational capacities. Technical strategies were, nevertheless, the only organizational strategies studied with an average implementation rate (51.7%) greater than 50%. Citizen engagement and non-citizen stakeholder strategies were utilized by only 34.6% and 38.6% of respondents, respectively. With respect to strategies being
used to build capacity for sustainability, most local governments appear to be employing a top-
down, expert-driven approach by emphasizing primarily technical strategies as opposed to a
more bottom-up, participative style that would be associated with greater involvement from
citizens and non-citizen stakeholders.

**Multiple Regression Assumptions**

Since path analysis and structural equation modeling are extensions of multiple
regression, the strict assumptions of multiple regression will be considered in this section.

**Sample Size**

To provide for generalizability of results, a sufficient sample size is necessary for
multiple regression procedures. While there is some lack of consensus on a minimum sample
size for structural equation modeling, there are some general guidelines in the research. One
straightforward guideline is a minimum sample size of 200 is necessary to sufficiently reduce the
risk of bias and potential problems with nonconvergence and improper solutions (Boomsma &
Hoogland, 2001). Another commonly cited heuristic includes having a minimum of 15 times the
number of observed variables (Stevens, 1996). In the original model under consideration in this
study there are eight observed variables (three strategies, four capacities, and the sustainability
index) which would require a minimum sample size of 120. Yet another heuristic is that
minimum sample size should be between five and ten times the number of free parameters in a
model (Hoogland & Boomsma, 1998). Since each variable typically has a path coefficient, a
variance, and an error term, this latter guidance would suggest that a model with eight variables should have a minimum sample size between 120 and 240. While larger sample sizes are generally always desirable, the sample size in this study (N = 264) exceeds each of these recommended benchmarks.

Descriptive Analysis of Residuals

While Table 15 and the scatter plot in Figure 9 do reveal some possible outliers, these are relatively few in number. Using Tabachnick and Fidell’s guidance, the critical value for evaluating the Mahalanobis distance is 24.32 with seven independent variables. Examining the data, there are no cases that exceed this threshold suggesting that outliers should not present a problem. The maximum value for Cook's distance was 0.06. This is substantially less than the recommended maximum of one suggesting that no unusual cases are having undue influence on the model (Tabachnick and Fidell, 2007).
Table 15: Descriptive Analysis of Residuals

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Value</td>
<td>5.42</td>
<td>34.78</td>
<td>16.87</td>
<td>7.07</td>
<td>264</td>
</tr>
<tr>
<td>Std. Predicted Value</td>
<td>-1.62</td>
<td>2.53</td>
<td>0.00</td>
<td>1.00</td>
<td>264</td>
</tr>
<tr>
<td>Standard Error of Predicted Value</td>
<td>0.47</td>
<td>1.64</td>
<td>0.92</td>
<td>0.21</td>
<td>264</td>
</tr>
<tr>
<td>Adjusted Predicted Value</td>
<td>5.27</td>
<td>34.33</td>
<td>16.87</td>
<td>7.06</td>
<td>264</td>
</tr>
<tr>
<td>Residual</td>
<td>-14.60</td>
<td>16.22</td>
<td>0.00</td>
<td>5.34</td>
<td>264</td>
</tr>
<tr>
<td>Std. Residual</td>
<td>-2.70</td>
<td>3.00</td>
<td>0.00</td>
<td>0.99</td>
<td>264</td>
</tr>
<tr>
<td>Stud. Residual</td>
<td>-2.75</td>
<td>3.03</td>
<td>0.00</td>
<td>1.00</td>
<td>264</td>
</tr>
<tr>
<td>Deleted Residual</td>
<td>-15.14</td>
<td>16.63</td>
<td>0.00</td>
<td>5.52</td>
<td>264</td>
</tr>
<tr>
<td>Stud. Deleted Residual</td>
<td>-2.78</td>
<td>3.08</td>
<td>0.00</td>
<td>1.01</td>
<td>264</td>
</tr>
<tr>
<td>Mahal. Distance</td>
<td>0.95</td>
<td>23.13</td>
<td>6.97</td>
<td>3.85</td>
<td>264</td>
</tr>
<tr>
<td>Cook's Distance</td>
<td>0.00</td>
<td>0.06</td>
<td>0.00</td>
<td>0.01</td>
<td>264</td>
</tr>
<tr>
<td>Centered Leverage Value</td>
<td>0.00</td>
<td>0.09</td>
<td>0.03</td>
<td>0.01</td>
<td>264</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Sustainability

Other Regression Assumptions

Residual plots facilitate the checking of the critical assumptions of normality, linearity, and homoscedasticity related to multiple regression procedures (Pallant, 2007). Upon inspection of the histogram (Figure 10), residual P-P plot (Figure 11) and the residuals scatterplot (Figure 12), all three assumptions of normality, linearity, and homoscedasticity appear to be reasonably supported.
Figure 10: Histogram Indicating Support for Normality Assumption

Figure 11: P-P plot Indicating Support for the Linearity Assumption
Figure 12: Residual Scatter Plot Indicating Support for the Homoscedasticity Assumption

A Durbin-Watson statistic of 1.916 also suggests that the independence of residuals assumption appears well supported without a significant threat from autocorrelation.

**Multicollinearity**

Lastly, based on the correlation matrix (Table 16) as well as additional collinearity diagnostic tests, multicollinearity does not appear to be a significant risk. Additionally, collinearity diagnostics also confirm that risk of multicollinearity is relatively low. All tolerances are .38 or higher indicating that a substantial amount of variability of each independent variable is not explained by other independent variables and providing support for a low risk of multicollinearity since generally only smaller values below 0.1 are typically perceived as a cause for concern (Pallant, 2007).
Table 16: Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Capacity</td>
<td>.702</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Capacity</td>
<td>.646</td>
<td>.564</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political Capacity</td>
<td>.520</td>
<td>.588</td>
<td>.506</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Capacity</td>
<td>.561</td>
<td>.502</td>
<td>.515</td>
<td>.520</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Citizen Stakeholder Strategies</td>
<td>.619</td>
<td>.687</td>
<td>.588</td>
<td>.553</td>
<td>.574</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citizen Engagement Strategies</td>
<td>.625</td>
<td>.639</td>
<td>.533</td>
<td>.511</td>
<td>.541</td>
<td>.680</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Technical Strategies</td>
<td>.622</td>
<td>.652</td>
<td>.540</td>
<td>.476</td>
<td>.653</td>
<td>.624</td>
<td>.610</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Multivariate Normality**

The maximum likelihood estimation method of structural equation modeling assumes multivariate normality. The AMOS software provides a means of testing, albeit imperfectly, multivariate normality by providing Mardia's coefficient for respective variables where critical ratios less than 2 support the normality assumption (Mardia, 1970). The normality assumption may also generally not be as critical for purely exogenous variables or those variables that are not influenced by other variables in the model. It is also noteworthy, however, that it has been shown that results are fairly robust against violations of multivariate normality for sample sizes larger than 200 with significant deviations having relatively minor impact on the analysis (Tabachnick & Fidell, 2007).

While Table 17 reflects that most model variables exhibit approximate univariate normality with the majority of univariate values of skewness and kurtosis ranging between -1.0 and 1.0, the Mardia coefficient of 6.15 indicates a marginal level of multivariate non-normality. None of the individual measures of univariate normality are above the cut-offs of two or seven.
for skewness and kurtosis, respectively, provided by Curran et al. (1995) that suggest reason for concern. Moreover, based on recent SEM multivariate non-normality simulation research, only minimal distortion or bias in chi-squared and standard error statistics is generally expected under even severe conditions of multivariate non-normality for sample sizes greater than 100 and "the usual interpretations of SEM parameters can be accepted" (Lei & Lomax, 2005, p. 16). Given these findings, no data transformations or deletions were performed.

Table 17: Evaluating Multivariate Normality with Mardia’s Coefficient

<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness</th>
<th>Critical Ratio</th>
<th>Kurtosis</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability</td>
<td>0.70</td>
<td>4.65</td>
<td>0.11</td>
<td>0.36</td>
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<tr>
<td>Managerial Capacity</td>
<td>0.39</td>
<td>2.57</td>
<td>(0.96)</td>
<td>(3.17)</td>
</tr>
<tr>
<td>Financial Capacity</td>
<td>0.52</td>
<td>3.48</td>
<td>(0.40)</td>
<td>(1.33)</td>
</tr>
<tr>
<td>Political Capacity</td>
<td>(0.22)</td>
<td>(1.49)</td>
<td>(1.19)</td>
<td>(3.95)</td>
</tr>
<tr>
<td>Technical Capacity</td>
<td>0.21</td>
<td>1.41</td>
<td>(0.11)</td>
<td>(0.36)</td>
</tr>
<tr>
<td>Technical Strategies (exogenous)</td>
<td>(0.14)</td>
<td>(0.94)</td>
<td>(1.34)</td>
<td>(4.44)</td>
</tr>
<tr>
<td>Citizen Engagement Strategies (exogenous)</td>
<td>0.27</td>
<td>1.81</td>
<td>(0.85)</td>
<td>(2.83)</td>
</tr>
<tr>
<td>Non-citizen Stakeholder Strategies (exogenous)</td>
<td>0.23</td>
<td>1.53</td>
<td>(1.36)</td>
<td>(4.52)</td>
</tr>
<tr>
<td>Multivariate Normality</td>
<td>9.58</td>
<td>6.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SEM Research Design**

Structural equation modeling and covariance structural modeling are both classified as multivariate correlational statistical procedures. Both techniques are useful to examine theories about hypothesized causal relationships between variables and can be considered extensions of multiple regression. A path coefficient, for example, is simply a standardized regression coefficient with the same meaning as the beta (β) coefficient derived from multiple regression. The fundamental difference between basic structural equation modeling or path analysis and
more complicated covariance structure modeling is the use of measurement models to measure latent constructs or variables that cannot be directly measured. While basic SEM or path analysis is restricted to only measured variables, covariance structure modeling also has the ability to handle latent constructs by combining factor analysis and multiple regression (Gall, Gall, & Borg, 2007).

There are several advantages associated with using structural equation modeling in lieu of multiple regression. One obvious initial advantage is that theoretical relationships are graphically modeled and can be more easily visualized and understood. A lesser known advantage is that SEM with measurement models, as stated previously, can be useful in modeling latent variable relationships without random error and SEM can also distinguish between direct and indirect effects which enriches the level of analysis (Gall, Gall, & Borg, 2007).

The initial analysis approach taken in this research was to test a structural equation diagram that assumed all model variables were measureable by all significant items in each respective scale. This path analysis or basic structural equation model was inclusive in the sense that all significant items in each scale were used in arriving at the summated score for a given measured variable regardless of their relative influence. The final revised model eliminated any insignificant relationships in the original model and also included any context variables that depicted a statistically significant relationship with the dependent variable of sustainability.

**Initial Structural Equation Model**

The initial hypothesized relationships studied in this research are depicted in Figure 13. Each strategy, capacity, and sustainability variable in the generic model was considered directly
measurable by a summated index that included all significant items in each respective scale. Shared covariance was assumed among the three organizational strategies (citizen engagement, non-citizen stakeholder, and technical) and this was confirmed with collinearity diagnostics and relatively high correlations in the correlation matrix. While the 27 contextual variables are not depicted in the diagram to avoid undue presentation clutter, these were also tested for significance in the original model.

The only statistical test available to evaluate structural equation model fit is the $\chi^2$ test ($\chi^2 = 62.7$, df = 9, p=.000). However, since the $\chi^2$ test is sensitive to sample size, it is often difficult
to obtain an insignificant result (\(p > .05\)) for larger sample sizes above 200 which suggests no
difference between the data and hypothesized model. As it is preferred to have an insignificant
\(\chi^2\), it is also desirable to have a \(\chi^2\) to degree of freedom (df) ratio of 2 or less (Hu and Bentler,
1999). The initial model results fell short of both of these benchmarks suggesting poor fit.
Another commonly used measure of model fit that is not as sensitive to sample size is RMSEA
(root mean square error approximation) with a recommended cut-off of .06 or lower and, to a
lesser extent, the CFI (comparative fit index) with a recommended cut-off of .95 or higher (Hu
and Bentler, 1999). The initial model, again, did not display a good fit with a RMSEA (root
mean square error approximation) of .15, i.e., not providing support that the hypothesized model
was consistent with the data.

The initial model results also exhibited two insignificant relationships. The first
insignificant relationship was between the political capacity variable and sustainability (\(p=.313\))
and the second insignificant relationship was between non-citizen stakeholder strategies and
technical capacity (\(p=.068\)). Furthermore, only three of the 27 contextual variables in the model
had significant relationships (\(p < .05\)) with the sustainability index variable. These were a self-
reported three year employment loss, the census derived 2009 population, and a dichotomous
variable that indicated whether the responding city belonged to a state on the west coast (CA,
OR, or WA). All three of these contextual variables had statistically significant positive
relationships with the sustainability index and their respective path coefficients are shown in
revised model (Figure 14).
Revised Structural Equation Model

Given the insignificant relationships discovered in the initial model run as well as the association between organizational capacities, adjustments were made to the original model with the aim of improving the model fit. This revised model is illustrated in Figure 14.

Figure 14: Revised Structural Equation Model
As indicated earlier, correlations between the three organizational capacities were moderately high and varied from a low of .50 between technical capacity and managerial capacity to a high of .59 between political capacity and managerial capacity. In SEM, covariances between endogenous variables (e.g., organizational capacities) are not permitted but it is possible to correlate these respective error residuals since it is theorized as well as empirically supported that they are interrelated. In addition, in the revised run, the insignificant political capacity variable was removed as well as the insignificant relationship between citizen stakeholder strategies and technical capacity. The revised model also includes the three contextual variables that retained statistical significance (p < .05) and added the noted covariances between them and other variables in the model. The noted covariance between the 'West Coast' and the 'Employment Loss' variables is reasonable since employment loss has been high on the west coast and, in particular, the state of California which accounted for the majority of city respondents from the west coast. Similarly, the added covariance between 'Population 2009' and 'Non-citizen Stakeholder Strategies' is also understandable since larger cities would likely tend to have larger organizational structures and resources and, consequently, greater involvement from management, employees, legislators as well as potential outreach to other non-citizen stakeholders such as businesses and non-profits.

The model fit substantially improved with the revised model. The test statistic or $\chi^2$ was insignificant ($\chi^2 = 33.3$, df=24, p=.099) which indicates that the hypothesis of no difference between model and the data cannot be rejected at the 5% level of significance. The CMIN/DF ratio of 1.4 and CFI of .99 both supported good fit. One of the most commonly used and least biased measures of SEM model fit, RMSEA, also indicated a strong fit at .038. At .067, even the
upper limit of the 90% confidence interval for RMSEA, was also very close to being in the acceptable range recommended for use by researchers (Hu and Bentler, 1999). All relationships in the revised model were statistically significant at the .05 level.

Examinining The Three Hypotheses

\textit{H1:} Local organizational strategies are positively associated with the development of local organizational capacities that advance local sustainability management.

In the final best-fitting SEM design in Figure 14, all three organizational strategies were positively associated with each of the organizational capacities. The three organizational strategies also had a moderately high degree of covariance. With one noted exception, all relationships were statistically significant (p < .05). The three organizational strategies (i.e., citizen engagement, non-citizen stakeholder strategies, and technical strategies) were relatively equal in their relationship with managerial capacity with standardized regression coefficients of either $\beta = .30$ or $\beta = .29$. With respect to the association with financial capacity, citizen engagement strategies had the highest positive association ($\beta = .30$) while non-citizen stakeholder strategies had the lowest ($\beta = .19$). Technical capacity was, not surprisingly, most highly associated with technical strategies ($\beta = .51$). Citizen engagement strategies also had a positive association with technical capacity ($\beta = .27$) but non-citizen stakeholder strategies had a weak ($\beta = .11$) and insignificant (p = .068) relationship with technical capacity. All three organizational strategies were also positively related to political capacity with citizen engagement and non-citizen stakeholder strategies having respective beta coefficients of .28 and .26. These findings suggest that while technical strategies are clearly superior in terms of developing technical
capacity, citizen engagement strategies and non-citizen engagement strategies have substantially higher associations with political capacity and relatively equal or greater influence with developing financial and managerial capacities.

**H2:** Local organizational capacities are positively associated with local sustainability management efforts.

All four organizational capacities were positively associated with sustainability. The political capacity relationship, however, was weak ($\beta = .05$) and insignificant ($p = .313$). This outcome suggests that developing political capacity does not directly affect sustainability. Given the prior findings of significant positive associations between the organizational strategies and political capacity, the possibility of political capacity as a mediating variable between the organizational strategies and other capacities was examined. A significant model ($p < .05$) with political capacity as an intermediate variable between the organizational strategies and organizational capacities was not found. If placed before the organizational strategies, the political capacity variable, however, did explain a fair amount of the variance of each of the organizational strategies with $R^2$ values ranging from .25 for technical strategies and .32 for the two other organizational strategies. This latter model was also significant with $p = .165$. This finding suggests that political capacity may be more associated with policy formulation, where stakeholder inputs and supports are prominent in agenda setting, determining policy priorities, and negotiating, than implementation given its indirect effect on sustainability implementation activities by influencing organizational strategies that are adopted to develop organizational capacities.
Given the study's focus on implementation, removing the political capacity variable strengthened the model’s fit. Technical, financial, and managerial capacities were all positively and significantly associated with sustainability practices in the revised model in Figure 14. Of the three organizational capacities, managerial capacity influenced sustainability practices to the greatest extent with a standardized regression coefficient of .45. The strength of the relationship between managerial capacity and sustainability was considerably more than the respective associations between the sustainability variable and financial capacity ($\beta = .24$) and technical capacity ($\beta = .21$). This is an interesting finding. While most cities appear to be primarily focusing on developing political and technical capacity as reflected by their relative higher rates of average use in Tables 8 and 9, managerial capacities, in particular, and financial capacities, to a lesser extent, appear to be more effective in influencing the adoption of sustainability practices. The considerably lower rates of average use of managerial (38.9%) and financial (31%) capacities relative to political (56.5%) and technical (53.1%) capacities indicate there is ample opportunity for further progress. This important finding reveals a need to improve management practices and financing mechanisms to further advance sustainability. Effectively implemented sustainability practices require sound managerial planning and goal setting as well as on-going performance measurement and evaluation. Similarly, sustainability activities are more likely to endure if financing mechanisms are not only creative and diverse but also offer stability and predictability.

$H3$: A capacity building model of strategies, capacities, and relevant context variables can explain a significant amount of the variation in local sustainability management practices.
The revised model in Figure 14 explained nearly two-thirds of the variation (64%) in sustainability practices across respondent cities. The revised model also explained half or more of the variation in managerial capacity ($R^2 = .58$) and technical capacity ($R^2 = .50$) as well as 40% of the variation in financial capacity. Of the three organizational strategies, technical strategies had the largest standardized indirect effect (.295) on sustainability. This finding supports the higher rate of action taken with respect to technical strategies (51.7%) by respondent cities. The indirect effects of citizen engagement strategies and non-citizen stakeholders on sustainability were, respectively, .261 and .179. This latter finding indicates that cities would benefit by utilizing relatively more citizen engagement strategies. Citizen engagement strategies were the lowest utilized organizational strategies with only 34.6% of respondent cities, on average, reporting their use.

As discussed earlier, the context variables included in this study generally had weak associations with sustainability practices and the majority lost significance when included in the model. The weak explanation of the contextual variables is consistent with recent studies that found the explanatory power of context-oriented variables in the range of 20 to 30% (Krause, 2010; Sharp, Daley, and Lynch, 2011). The population, west coast, and employment loss context variables were all found to be positively and significantly associated with sustainability practices with population having the greatest influence ($\beta = .16$). The west coast variable's significance suggests cities from western states have more support for undertaking sustainability activities from citizens as well as internal stakeholders such as elected officials and management. The significance of the employment loss variable may be mostly associated with the time period of the survey. Economic stress, including unemployment, has affected many cities since the
beginning of the Great Recession in late 2007. Based to some degree on loss of employment experienced, many local governments have received federal stimulus funds directed towards promoting sustainability related activities (ECOS, 2010). Cities with higher rates of unemployment might also be more actively pursuing green or sustainability related jobs. With respect to the context variables, it is acknowledged that a slightly better fitting model may be developed by including more relationships between the context variables and the organizational strategies and capacities. However, given the low associations previously discussed and further detailed in Appendix C, the complexity of such a model would need to be non-trivially increased for an expected minor improvement in fit and explanatory power.
CHAPTER FIVE: CONCLUSION

Final observations and recommendations associated with this study will be discussed from three diverse, but potentially, complementary perspectives. First, the study's findings will be interpreted as they may relate to practitioners. In terms of implementing sustainability activities, what does the study suggest about what practitioners are doing well versus where there may be room for improvement? These practitioner oriented observations are particularly salient given the empirical model's focus on organizational capacities. As noted by Lavergne and Saxby (2001), capacity development is not a passively acquired skill that can be transferred or delivered but is best cultivated by engaging relevant stakeholders, by actively doing, and by learning from experience and evaluation. Second, what insights from the study might beneficially inform future policymaking to more effectively promote the pursuit of sustainability practices? Lastly, how can the findings as well as the shortcomings of this study serve as a guide for future research? Does the study or its limitations identify a gap in the literature that needs further attention?

Practitioner Implications

The findings of this study indicate there is considerable room for improvement in terms of implementing sustainability activities. Of the 51 activities that were included in the sustainability index, 41 or more than 80% were adopted by fewer than 50% of the respondents. The findings indicate that more attention, specifically, should be given to the economic dimension of sustainability where, on average, only 19.5% of the sustainability practices were
implemented. The economic dimension of sustainability was the study's largest dimension accounting for 23 of the 51 items in the sustainability index and yet, no economic related activity was adopted by more than half of the respondents. Practitioners may more universally demonstrate the true viability of sustainability as an enduring concept by implementing sustainability initiatives in a more balanced manner.

With respect to capacity utilization, the findings indicate practitioners are focusing on political and technical capacities to a much greater degree than financial and managerial capacities. The statistical results did not find a significant relationship between political capacity and sustainability implementation despite this being the organizational capacity that respondents, on average, were utilizing the most. While it is acknowledged that political capacity may indirectly affect sustainability practices, the results suggest the three other capacities (technical, financial, and managerial) have substantially stronger positive direct effects on influencing sustainability implementation. Of particular significance is the opportunity for further development of managerial capacity. Even though managerial capacity was the organizational capacity that was most strongly related to sustainability implementation efforts, it was, on average, being utilized by less than 40% of respondents. Among managerial capacity activities, the study reveals that two of the most underused areas calling for greater attention from practitioners are development and evaluation of performance measures. Consistent with this finding, the criteria used for the national Baldrige award for organizational performance excellence clearly emphasizes the importance of utilizing evidence based management to achieve significant results (NIST, 2011). Meaningful improvement of local sustainability efforts will
ultimately be dependent on the on-going process of open and transparent performance measurement and evaluation.

With respect to adopting strategies to develop capacities, the study's findings suggest practitioners could further advance sustainability by employing strategies to promote greater involvement from citizens as well as non-citizen stakeholders. Citizen engagement and non-citizen stakeholder strategies are both influencing managerial and financial capacities, specifically, to a much greater extent than they are being utilized. In particular, the results of sustainability efforts need to be more frequently explained to citizens to engage and garner their continuous support for sustainability related practices. The findings indicate that chambers of commerce, local neighborhood organizations, community workshops, citizen surveys, and conflict resolution techniques are all underutilized forms of engaging citizens and encouraging greater bottom-up participation. Similarly, from the perspective of non-citizen stakeholders, there is an opportunity to increase sustainability related activity participation from city legislators, business groups, and non-profits.

These findings are consistent with the need to develop organizational capacities within government for a new governance that promises greater collaboration by shifting attention away from stand alone internal hierarchies to an integrated network of actors. Effective local governance necessitates that public organizations tackling complex, ill-defined issues such as sustainability recognize the various interdependencies involved and facilitate the creation of networks of actors that promotes higher degrees of collaboration. Notwithstanding, this need for greater collective action often complicates implementation efforts. To effectively address these new challenges, public managers will need to develop greater capacity for multiple skills
including advance planning and goal setting, mobilizing and coordinating resources, negotiation and persuasion, and bridge-building (Salamon, 2002). Recent noteworthy studies have also made related recommendations to local leaders to advance their sustainability efforts (Francis & Feiock, 2011; Svara, Read & Moulder, 2011).

**Policy Implications**

The uncertainty and evolving nature of sustainability as a concept provides some possible insights on the direction of future local sustainability policy. Since citizen engagement and non-stakeholder involvement has been shown to be influential in advancing sustainability implementation, local policies should also encourage greater public, private, and non-profit partnerships. Policymakers need to continue building their capacity for performing relevant stakeholder analysis to encourage more equitable, effective, and efficient means of expanding stakeholder participation. In particular, the results show that private citizens, business groups, and non-profits appear to be involved at less than desirable levels (less than 50% in most areas) in local sustainability efforts. Universities and research institutions, as potential sources of technical expertise, were also underutilized (37.5%). From the perspective of developing organizational technical capacity, partnering and investing in basic research through universities and research institutions is an advisable productive policy.

Given the high level of uncertainty with many sustainability initiatives, policies should also be designed to mitigate risk. The pursuit of sustainability, by its very nature, inherently involves balancing priorities so overemphasizing one dimension of sustainability at the expense of the others may be counterproductive in the long run. The pendulum never settles and achieves
balance if we keep swinging it wildly from one side to the other. Consistent with change theory, risk management policies that are supportive of incremental implementation and experimentation may also be advisable under conditions of high uncertainty (Kotter, 1995). More recent research supports this notion that highly successful organizations exercise greater discipline and frequently scale innovation by being more empirical and learning experientially (Collins & Hansen, 2011).

Policies that seek to initially limit risk and provide additional funding contingent on performance are more apt to create the right incentives for performance measurement, evaluation, and continuous improvement that previous analysis suggests are sorely needed at the practitioner level. Developing transparent policies that help distinguish and recognize high performers also fosters greater trust and confidence in public management that is likely to further reinforce aforementioned citizen and non-citizen engagement efforts.

**Future Research**

Further research in this area can be guided by both the strengths and limitations of this study. The topic of implementation is generally underserved in the literature. It seems easier to talk and write about strategy than to focus on execution. And yet, little gets done if organizations ignore what capabilities are necessary to accomplish their goals. The capacity building framework utilized in this study offers a powerful link between strategy and implementation. This study has shown that organizational strategies and capacities can be useful in explaining a significant amount of the variation in local sustainability implementation efforts. One of the main
strengths of the study is its simplicity. As Pressman and Wildavsky (1973) warned, complexity is the enemy of implementation. While contingency theorists remind us that everything is situational, it is possible to identify what within an organization's control may contribute to implementation success and to develop strategies that build those capacities. Yes, there are alternative explanations, but by focusing on only three key capacities this study was able to explain nearly two-thirds of the variation in local sustainability implementation practices. This is a critically important result. As good managers know, recognizing critical success factors and attempting to control the controllable are important keys to achieving good execution. The generalizability of the capacity building approach in furthering research on organizational implementation initiatives appears to be very promising indeed.

This study identified the insignificant direct relationship between political capacity and sustainability implementation. Notwithstanding, future research that explores how political capacity indirectly influences sustainability particularly in terms of policy formulation may be fruitful. Analyzing the critical role of leadership in managing sustainability implementation efforts could also make a noteworthy contribution. Assessing leadership competency with strategic planning, team building, initiating actions, mobilizing resources, negotiating, as well as performance measurement and evaluation all merit further study. When actions depend on multiple stakeholders and there are numerous interdependencies, better understanding how public managers need to work on expanding engagement and collaboration opportunities by becoming enablers rather than merely managers is essential (Salamon, 2002).

Given the limited, cross-sectional nature of this study, a related model could be developed to study implementation activities over a longer period of time on a longitudinal basis.
The longitudinal model could also be adapted to go beyond implementation and evaluate outcomes. While studying implementation efforts can provide useful insights, it is not sufficient. Ultimately, outcome assessment is necessary to gauge the real degree of success U.S. cities are experiencing with local sustainability efforts. Outcome assessment will help clarify the inherent tradeoffs and opportunity costs that practitioners face and better answer the critical questions of "what kind of sustainability" and "how much sustainability" is optimal.

Lastly, given the ill-defined nature of sustainability, the empirical aspect of this study is, perhaps, one of its most notable contributions. Conclusions and recommendations provided herein were derived from data driven, albeit self-reported, observations. Future studies might use analytical techniques such as data envelopment analysis to benchmark performance or conduct simulations based on varying efforts or inputs. Just as managers can only manage what they measure, quality research depends on evidence based conclusions (Wan, 2002). While this study was limited to some extent by relying on self-reported perceptions, implementation or outcome measures that possess greater objectivity and independence would be highly desirable. The best way to garner enduring support for a sustainability related policy is to allow the policy to speak for itself by providing verifiable evidence that it is working. Such evidence based studies are not only likely to strengthen the credibility of the research among researchers but also be most useful to practitioners in terms of offering actionable guidance.
APPENDIX A: EXPLANATIONS FOR PURSUING SUSTAINABILITY
## Supplemental Explanations for Pursuing Sustainability

<table>
<thead>
<tr>
<th>Problem Identification</th>
<th>Environmental Response</th>
<th>Political Response</th>
<th>Capacity Building</th>
<th>Diffusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Environmental degradation and natural resource depletion</td>
<td>Civic pressures for better environmental service and products</td>
<td>Mobilizing organizational resources to initiate and implement sustainability efforts</td>
<td>Initiating and duplicating success of others in sustainability</td>
</tr>
<tr>
<td>Policy Objective</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Responding to and alleviating citizens’ concerns on the environment (e.g., interest group politics)</td>
<td>Improving organizational capacities (managerial, financial, political, and technical dimensions)</td>
<td>Maximizing the impact of best practices (i.e., mimetic isomorphism)</td>
</tr>
<tr>
<td>Phase in Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus and Phase in Policy Implementation</td>
<td>Formulating and implementing environmental protection driven policies (i.e., creates cognitive dissonance consistent with unfreezing stage of organizational change (Lewin, 1951))</td>
<td>Formulating and implementing interest group-driven policies (i.e., idea championing phase consistent with unfreezing stage of organizational change (Lewin, 1951))</td>
<td>Implementing and sustaining formulated policies where an organization must develop necessary proficiency and expertise to support change (i.e., providing resources and institutionalizing change phase; consistent with change and refreezing stages of organizational change, (Lewin, 1951))</td>
<td>Learning from and implementing proven policies and best practices of other organizations (i.e., disseminating change phase; consistent with refreezing stage of organizational change, (Lewin, 1951))</td>
</tr>
<tr>
<td>Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philosophy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Targeting on environmental pressure and stress (i.e., environment protection)</td>
<td>Providing citizens with environmental products and services of improved quality (i.e., address citizen concerns)</td>
<td>Developing institutional strategies to strengthen organizational capacities of implementation (i.e., prepare government for effective implementation)</td>
<td>Identifying the best practices and the conditions to apply the practices in institutional settings (i.e., “do more of what is working best”)</td>
</tr>
<tr>
<td>Examples of Highly Influencing Variables and their possible relationships with sustainability efforts</td>
<td>Population growth and density (+)</td>
<td>Residents’ income (+)</td>
<td>Involving political stakeholders’ in sustainability planning process (+)</td>
<td>Geographical proximity of a government (+)</td>
</tr>
<tr>
<td></td>
<td>Growth in highly polluted industries (+)</td>
<td>Residents’ education attainment (+)</td>
<td>Involving city employees in crafting a sustainable version of the community (+)</td>
<td>Institutional context of a government (+)</td>
</tr>
<tr>
<td></td>
<td>Consumption of natural resources such as wetlands, forests, and high quality water (+)</td>
<td>Residents’ age (-)</td>
<td>Seeking technical support from universities (+)</td>
<td>Similarly situated government (+)</td>
</tr>
<tr>
<td></td>
<td>Consumption of fossil-based energy (+)</td>
<td>Residents’ liberal-leaning (progressive) ideology (+)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B: CAPACITY BUILDING BENEFITS
CAPACITY BUILDING BENEFITS

Greater Awareness and Development of Capabilities → Improved Results, Confidence, Credibility

Greater Awareness of Interdependencies → More Opportunities for Collaboration

Capacity Building Process → Higher Levels of Social Capital

Organizational / Community Learning

Greater Potential Benefits from Collective Action
APPENDIX C: CONTEXT VARIABLES
Context Variables

Political Attitude Variables:
The majority of city residents tend to be politically liberal (progressive)
The majority of city elected officials tend to be politically liberal (progressive)
2008 Percent Democrat Presidential Vote

Resource Availability Variables:
Financial resources are NOT available for new programs and initiatives
Total revenues in the city have declined more than 10 percent for the past three years
The city has experienced a significant loss of employment for past 3 years
Financial incentives from state government influence sustainability actions

Demographic Variables:
Median Household Income
Percent Below Poverty Level
Percent High School Graduates
Median Age
Percent Black
Percent White
Over 10 percent of the city’s population is in poverty
Over 20 percent of the city’s population is below 18 years old
Over 80 percent of populations have high school educations or above

Environmental Pressure Variables:
2000 Urban Percent
2000 Land Area
2000 Population
2007 Population
2009 Population
2009 Population Density
Percent Manufacturing
The city has a large manufacturing employment force
Economic development and growth are our top priority
Crime is a major concern in our city
Public safety is our top priority
While the two Appendix C tables below indicate that several context variables had weak significant relationships with strategies and capacities, adding these relationships to the structural equation model would substantially increase complexity and result in only very marginal improvement in fit and explanatory power. Figure 14 supports that local sustainability implementation practices are primarily directly influenced by three organizational capacities and indirectly by three organizational strategies that are used to build those respective capacities.

<table>
<thead>
<tr>
<th>Context Variables</th>
<th>Political Capacity</th>
<th>Technical Capacity</th>
<th>Financial Capacity</th>
<th>Managerial Capacity</th>
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<tbody>
<tr>
<td>Population</td>
<td>NS</td>
<td>NS</td>
<td>0.16</td>
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<td>Population Density</td>
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<td>0.17</td>
<td>NS</td>
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</tr>
<tr>
<td>Median Household Income</td>
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<td>NS</td>
<td>NS</td>
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</tr>
<tr>
<td>Below Poverty Level Percent</td>
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<td>NS</td>
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</tr>
<tr>
<td>Democratic Presidential 2008 Vote</td>
<td>0.24</td>
<td>0.14</td>
<td>0.14</td>
<td>0.28</td>
</tr>
<tr>
<td>West Coast</td>
<td>0.14</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Manufacturing Percent</td>
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<td>-0.13</td>
<td>NS</td>
<td>-0.17</td>
</tr>
<tr>
<td>Public Safety is Top Priority</td>
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<td>NS</td>
<td>-0.18</td>
<td>-0.17</td>
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<tr>
<td>Financial Incentives From State Government</td>
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<td>0.26</td>
<td>0.19</td>
<td>0.16</td>
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<tr>
<td>Majority of City Residents are Politically Liberal/Progressive</td>
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<td>0.29</td>
<td>0.26</td>
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<tr>
<td>Majority of City Elected Officials are Politically Liberal/Progressive</td>
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<td>0.29</td>
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<td>State Procedural Requirements Facilitate Adoption of Sustainability Initiatives</td>
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<td>0.19</td>
<td>0.20</td>
</tr>
<tr>
<td>State Organization of Sustainability Initiatives</td>
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<td>0.19</td>
<td>NS</td>
<td>0.22</td>
</tr>
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</table>

Note: All relationships significant at 0.05 level. 'NS' indicates insignificant relationships.

<table>
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<tr>
<th>Context Variables</th>
<th>Citizen Engagement Strategy</th>
<th>Non-Citizen Stakeholder Strategy</th>
<th>Technical Strategy</th>
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<tr>
<td>Population Density</td>
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<td>0.18</td>
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<tr>
<td>High School Graduation Percent</td>
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<tr>
<td>West Coast</td>
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<td>0.12</td>
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</tr>
<tr>
<td>Manufacturing Percent</td>
<td>-0.12</td>
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<td>-0.19</td>
</tr>
<tr>
<td>Public Safety is Top Priority</td>
<td>NS</td>
<td>NS</td>
<td>-0.13</td>
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<tr>
<td>Financial Incentives From State Government</td>
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<td>State Organization of Sustainability Initiatives</td>
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<td>0.20</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Note: All relationships significant at 0.05 level. 'NS' indicates insignificant relationships.
APPENDIX D: SUSTAINABILITY SURVEY
National Survey of Sustainability Management in U.S. Cities

Instruction: Please place a ✓ next to each action your city has taken. Check all that apply.

Question 1: To practice environmental sustainability, our city has…
[ ] Purchased alternative fuel vehicles for city business
[ ] Implemented a program that systematically conserves or plants trees
[ ] Constructed new building based on LEED (Leadership in Energy and Environmental Design) or other environmentally friendly standards.
[ ] Utilized LEED or Commercial Interiors (CI) specifications to renovate existing buildings
[ ] Adopted green cleaning and maintenance procedures
[ ] Adopted a green standard as official minimum criteria for new government buildings
[ ] Adopted green landscaping ordinance for local government buildings
[ ] Operated a website dedicated to green city programs
[ ] Posted air quality index or/and water quality testing results on city website
[ ] Used renewable energy (solar, wind, geothermal heat etc.) in city departments’ operations
[ ] Developed an environmentally preferable purchasing program
[ ] Offered energy audits to citizens, business, and community stakeholders
[ ] Offered renewable energy (solar, wind, geothermal heat etc.) to citizens or customers
[ ] Purchased and protected environmentally sensitive lands
[ ] Offered green technology education classes or workshops to employees
[ ] Offered green technology education classes or workshops to the community
[ ] Become a member of a sustainability group (e.g., US Green Building Council—USGBC, or Local Government for Sustainability—ICLEI, etc)

Question 2: To practice economic sustainability, our city has…
[ ] Linked environmental goals to publicly-financed incentive packages
[ ] Developed policies to create and strengthen markets for green goods and services
[ ] Built partnerships with the business community to achieve sustainability goals
[ ] Created a Green Economic Development Plan document
[ ] Created demand for green products through public procurement policies
[ ] Provided a green-collar workforce training assistance
[ ] Built capacity to “green” existing business processes
[ ] Implemented “Buy Local” campaigns
[ ] Promoted greening location decisions
[ ] Established a brownfields redevelopment fund
[ ] Publicly committed to a green-collar jobs strategy
[ ] Created a green-collar jobs taskforce
[ ] Identified green-collar goals and assessed existing local opportunities
[ ] Density bonus for buildings achieving LEED certification
[ ] Property tax credit to any commercial building that achieves LEED certification
[ ] Priority permitting and fee waivers for installation of green technologies
[ ] Fee reductions to cover the cost of LEED certification
[ ] Residential green building checklist
[ ] Provide low interest loans for energy efficiency measures and building materials
[ ] Designated locations for alternative energy generation, R&D, or manufacturing
[ ] Expedited application and permit process for alternative energy facilities
[ ] Incentives that lower financial barriers to energy efficiency gains by businesses
[ ] Zoning or regulations that allow for onsite renewable energy systems for businesses
Question 3: To practice social sustainability, our city has…
[ ] Offered incentives for construction of green affordable housing
[ ] Offered incentives for location efficient affordable housing
[ ] Offered orientation classes for residents of affordable housing
[ ] Promoted and accommodated bicycle use (e.g., bike lanes)
[ ] Installed appropriate bicycle security at public amenities
[ ] Arranged carpool/vanpool assistance
[ ] Promoted and educated the public on water conservation
[ ] Monitored water quality
[ ] Maintained an on-call water quality program
[ ] Maintained organic community gardens
[ ] Offered education on organic farming

Question 4: To develop and achieve goals for sustainability, our city has…
[ ] Designated an office to coordinate city’s sustainability initiatives
[ ] Designated individual(s) (but not an office) to coordinate city’s sustainability initiatives
[ ] Convened city-wide meetings to discuss commitments for sustainability for past 12 months
[ ] Included commitments for sustainability in the city’s goal or mission statement
[ ] Incorporated sustainability principles into city government’s strategic plan
[ ] Incorporated sustainability principles into city government’s comprehensive plan
[ ] Incorporated sustainability principles in city departments’ operations
[ ] Developed a city-wide sustainability plan
[ ] Developed performance measures (indicators) to evaluate city’s sustainability initiatives
[ ] Monitored and tracked the performances of city’s sustainability initiatives
[ ] Evaluated the performances of city’s sustainability initiatives
[ ] Improved performances of city’s sustainability initiatives based on performance evaluation

Question 5: To finance sustainability, our city has…
[ ] Budgeted for the city government’s sustainability initiatives
[ ] Issued debts to finance sustainability initiatives
[ ] Applied grants to finance sustainability initiatives
[ ] Maintained the funding level for the city’s sustainability activities
[ ] Offered tax (or financial) incentives for the residential or commercial use of carbon-reducing technologies
[ ] Offered tax (or financial) incentives for developing or redeveloping green properties
[ ] Funded capital projects related to sustainability initiatives

Question 6: Our sustainability efforts have support from…
[ ] The Mayor’s office
[ ] The City Manager’s office
[ ] Most department heads in the city
[ ] Most managers in the city
[ ] Most supervisors in the city
[ ] Most employees in the city
[ ] Most legislators in the city
[ ] Most citizens of the city
[ ] Local business leaders of the city
[ ] Agencies in other governments
[ ] City staff capable of using the green technology
[ ] Universities or research communities specialized in green technologies or strategies
Question 6 continued: Our sustainability efforts have support from…
[ ] Private consultants specialized in green technologies or strategies
[ ] Professional institutions of green initiatives such as USGBC and ICLEI
[ ] Others. Please specify:

Question 7: To implement sustainability initiatives, our city has…
[ ] Involved city legislators in crafting a sustainable version of the city
[ ] Involved city management in crafting a sustainable version of the city
[ ] Involved city employees in crafting a sustainable version of the city
[ ] Involved business groups in developing a sustainable version of the city
[ ] Focused on getting citizens’ support in our sustainability efforts
[ ] Frequently explained the results of sustainability efforts to citizens
[ ] Actively sought technical expertise of universities and research institutions
[ ] Actively sought technical expertise of consulting firms
[ ] Actively sought expertise of professional organizations such as USGBC or ICLEI
[ ] Developed the technical expertise of our own staff in sustainability efforts
[ ] Actively sought best practices information from other governments
[ ] Other strategies. Please specify:

Question 8: To encourage citizens’ involvement in sustainability initiatives, our city has used…
[ ] Community visioning workshops
[ ] Consensus building workshops
[ ] Citizen surveys
[ ] Conflict resolution techniques and mediation roundtable discussions
[ ] Information provision activities (e.g., newspaper articles, web-based announcements)
[ ] Citizen boards and commissions
[ ] Local neighborhood organizations
[ ] Chambers of commerce
[ ] Other citizen initiatives. Please explain:

Question 9: The sustainability efforts in our city have resulted in…
[ ] Monetary savings
[ ] More business relocating to our city
[ ] Increased economic activities
[ ] A transformed local economy with significantly more green businesses
[ ] Saving in natural resources such as water, forest, and open space
[ ] Reduction in pollution (water, air, etc)
[ ] Improvement of the quality of life for citizens
[ ] Increase in awareness of city officials and employees on the need of sustainability
[ ] Increase in public awareness on the need of sustainability
[ ] Improved image of our city among citizens and businesses
[ ] Other sustainability benefits. Please specify:

Question 10: Check all the following conditions that apply to your city.
[ ] Over 10 percent of the city’s population is in poverty
[ ] Over 20 percent of the city’s population is below 18 years old
[ ] The city has a large manufacturing employment force
[ ] Over 80 percent of populations have high school educations or above
[ ] Financial resources are NOT available for new programs and initiatives
[ ] Total revenues in the city have declined more than 10 percent for the past three years
Question 10 continued: Check all the following conditions that apply to your city.

[ ] The city has experienced a significant loss of employment for past 3 years
[ ] Economic development and growth are our top priority
[ ] Crime is a major concern in our city
[ ] Public safety is our top priority
[ ] Financial incentives from state government influence sustainability actions
[ ] The majority of city residents tend to be politically liberal (progressive)
[ ] The majority of city elected officials tend to be politically liberal (progressive)
[ ] State procedural requirements facilitate the adoption of sustainability initiatives in our community
  (i.e. state review of local policies/programs, funding linked to local efforts)
[ ] The organization of sustainability initiatives at the state level influences local sustainability actions
  (i.e. dedicated departments, specialized programs)
[ ] Please list the most useful programs offered by state agencies to support local sustainability efforts:

Which of the following best describes your state’s approach to local sustainability?
(Check only one please)
[ ] A “Hands Off” approach
[ ] Coercion via state authority and legislative action
[ ] Incentives and inducements

Question 11: Your current position (Check one)

[ ] City Manager, or Chief Executive Officer, or Chief Administration Officer
[ ] Chief Planning Director
[ ] Sustainability Manager
[ ] Other. Please state your position:

Question 12: How familiar are you with your city’s sustainability activities? (Check one)
[ ] Very familiar  [ ] Familiar  [ ] Somewhat familiar  [ ] Not Familiar

Question 13: What is your city’s form of government? (Check one)
[ ] Council-manager  [ ] Mayor-council  [ ] Commission  [ ] Township  [ ] Other:

Question 14: How many city council members represent your city? ______________________

Question 15: How many city council members are elected "at large"? ____________________

THANK YOU VERY MUCH!

Please use the enclosed prepaid envelope to return your survey.
APPENDIX E: INSTITUTIONAL REVIEW BOARD LETTER
Approval of Exempt Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138

To: Christopher V. Hawkins and Co-PI: Xiaohu Wang

Date: September 02, 2010

Dear Researcher:

On 9/2/2010, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review: Exempt Determination
Project Title: National Survey of Sustainability Management in U.S. Cities
Investigator: Christopher V. Hawkins
IRB Number: SBE-10-97004
Funding Agency: College of Health and Public Affairs (COHPA)
Grant Title: State Lead Environmental Sustainability: Organization and Performance Measurement
Research ID: NA

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in IRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Joseph Bienitzki, DVM, UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Marutari on 09/02/2010 10:55:19 AM EDT

IRB Coordinator
APPENDIX F: SUSTAINABILITY MEASUREMENT ITEMS
Measuring Sustainability in U.S. Cities

"To practice environmental sustainability, our city has…"
- Adopted green technology education classes or workshops to employees
- Offered renewable energy (solar, wind, geothermal heat etc.) to citizens or customers
- Operated a website dedicated to green city programs
- Purchased alternative fuel vehicles for city business
- Offered renewable energy (solar, wind, geothermal heat etc.) in city departments’ operations
- Utilized LEED or Commercial Interiors (CI) specifications to renovate existing buildings

"To practice economic sustainability, our city has…"
- Built capacity to “green” existing business processes
- Created demand for green products through public procurement policies
- Designated locations for alternative energy generation, R&D, or manufacturing
- Developed policies to create and strengthen markets for green goods and services
- Established a brownfields redevelopment fund
- Expediting application and permit process for alternative energy facilities
- Fee reductions to cover the cost of LEED certification
- Identified green-collar goals and assessed existing local opportunities
- Implemented “Buy Local” campaigns
- Incentives that lower financial barriers to energy efficiency gains by businesses
- Linked environmental goals to publicly-financed incentive packages
- Promoted greening location decisions
- Property tax credit to any commercial building that achieves LEED certification
- Provided low interest loans for energy efficiency measures and building materials
- Provided a green-collar workforce training assistance
- Publicly committed to a green-collar jobs strategy
- Resational green building checklist
- Zoning or regulations that allow for onsite renewable energy systems for businesses

"To practice social sustainability, our city has…”
- Arranged carpool/vanpool assistance
- Installed appropriate bicycle security at public amenities
- Maintained organic community gardens
- Monitored water quality
- Offered education on organic farming
- Offered incentives for construction of green affordable housing
- Offered incentives for location efficient affordable housing
- Offered orientation classes for residents of affordable housing
- Promoted and accommodated bicycle use (e.g., bike lanes)
- Promoted and educated the public on water conservation
APPENDIX G: CAPACITY MEASUREMENT ITEMS
Capacities for Sustainability

**Political Capacity -- "Our sustainability efforts have support from..."**
- Agencies in other governments
- Local business leaders of the city
- Most citizens of the city
- Most department heads in the city
- Most employees in the city
- Most legislators in the city
- Most managers in the city
- Most supervisors in the city
- Nonprofits or other stakeholders
- The Mayor’s office

**Technical Capacity -- "Our sustainability efforts have support from..."**
- City staff capable of using the green technology
- Private consultants specialized in green technologies or strategies
- Professional institutions of green initiatives such as USGBC and ICLEI
- Universities or research communities specialized in green technologies or strategies

**Financial Capacity -- "Our city has..."**
- Applied grants to finance sustainability initiatives
- Budgeted for the city government’s sustainability initiatives
- Funded capital projects related to sustainability initiatives
- Issued debts to finance sustainability initiatives
- Maintained the funding level for the city’s sustainability activities
- Offered tax (or financial) incentives for developing or redeveloping green properties
- Offered tax (or financial) incentives for the residential or commercial use of carbon-reducing technologies

**Managerial Capacity -- "Our city has..."**
- Convened city-wide meetings to discuss commitments for sustainability for past 12 months
- Designated an office to coordinate city’s sustainability initiatives
- Developed a city-wide sustainability plan
- Developed performance measures to evaluate city’s sustainability initiatives
- Evaluated the performances of city’s sustainability initiatives
- Improved performances of city’s sustainability initiatives based on performance evaluation
- Included commitments for sustainability in the city’s goal or mission statement
- Incorporated sustainability principles in city departments’ operations
- Incorporated sustainability principles into city government’s comprehensive plan
- Incorporated sustainability principles into city government’s strategic plan
- Monitored and tracked the performances of city’s sustainability initiatives
Strategies for Increasing Capacity

Citizen Engagement Strategies -- "Our city has used…"
Chambers of commerce
Citizen boards and commissions
Citizen surveys
Community visioning workshops
Conflict resolution techniques and mediation roundtable discussions
Consensus building workshops
Focused on getting citizens’ support in our sustainability efforts
Frequently explained the results of sustainability efforts to citizens
Information provision activities (e.g., newspaper articles, web-based announcements)
Local neighborhood organizations
Other citizen initiatives

Non-Citizen Stakeholder Strategies -- "Our city has…"
Involved business groups in developing a sustainable version of the city
Involved city employees in crafting a sustainable version of the city
Involved city legislators in crafting a sustainable version of the city
Involved city management in crafting a sustainable version of the city
Involved nonprofits or other stakeholders in crafting a sustainable version of the city

Technical Strategies -- "Our city has…"
Actively sought best practices information from other governments
Actively sought expertise of professional organizations such as USGBC or ICLEI
Actively sought technical expertise of consulting firms
Actively sought technical expertise of universities and research institutions
Developed the technical expertise of our own staff in sustainability efforts
REFERENCES


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doi:10.1002/pad.4230150502


doi:10.1006/jeem.1994.1029

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