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How do external conditions affect the design of local governments' sustainability strategies?

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ABSTRACT

Local governments nationwide have been adopting a variety of sustainability practices in the absence of strong federal guidance. The collection of these practices, which differ in design, forms the local government's sustainability strategy. Some local governments may develop a more focused sustainability strategy to achieve more predictable environmental benefits around a narrower array of environmental issues. By contrast, other local governments are developing a more comprehensive sustainability strategy that is more broadly focused to address complex, interconnected environmental issues. However, the external conditions that give rise to these different strategies is not well understood. Drawing on data for more than 950 U.S. municipal governments, this study provides important evidence that local governments' comprehensive sustainability strategies are influenced more by their community constituents and external environmental settings, with greater pressures in particular from constituents in new economy industries and environmental NGOs. These strategies are also more strongly related to higher disaster risk in the external environmental setting than more focused sustainability strategies. These findings broaden our understanding about why local governments' sustainability strategies differ in their design, which may provide a starting point for understanding how different sustainability strategies relate to actual environmental performance outcomes.

Key words Sustainability strategy; focused sustainability strategy; comprehensive sustainability strategy; local governments; community constituents; environmental setting; disaster risk

1. Introduction

Since the 1992 Rio Earth Summit, many local governments have developed a suite of sustainability programs designed to induce individuals and organizations to collectively improve their communities' environmental (Ayre and Callway, 2005) and social conditions. These programs target

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a variety of concerns, from solid waste recycling and energy usage, to land development (Feiock and Coutts, 2013) and community well-being, and have the potential to lead to sweeping shifts in social norms regarding sustainability (Engel, 2006). However, as their prevalence has increased, so too have concerns about local governments' strategic approaches towards designing their sustainability programs (Posner and Weisbach, 2010; Wiener, 2007).

Prior literature has examined local governments' decisions to develop a particular sustainability practice (Sharp et al. 2011) or how a particular sustainability practice is designed (Wang et al. 2012). Other research has considered the number of sustainability practices a local government might adopt (Bae and Feiock 2013; Hawkins et al. 2016; Portney 2003) and the factors associated with variations in local governments' commitments to sustainability. However, such efforts have been limited because local governments' sustainability practices tend to address a wide range of issues from land use to social inclusion and climate change issues (Hawkins et al. 2016), and each issue can be explained by a unique theoretical mechanism (Swann and Deslatte 2019). What is missing from the discussion is how local governments' individual sustainability practices, taken together, form patterns that give insight to their overall sustainability strategies.

We suggest that the organization strategy literature may serve as a reasonable framework for examining why local governments' sustainability practices may vary in the scope of issues that they address (e.g. Auld 2014; Boyne and Walker 2004; Enticott and Walker 2008; Gupta et al. 2006; Porter 1980). Further, this literature offers a suitable lens to explain how organizations shape different types of strategies in response to their external conditions, which leads to different patterns in their organizational practices (Boyne and Walker 2004; Enticott and Walker 2008; Porter 1980). We extend the organizational strategy research to the local sustainability context by explaining why local governments design their sustainability strategies differently (Ji and Darnall 2018). We posit that the design of these strategies is shaped by community constituents and the external environmental setting in which the local government is embedded.

Using data from the 2010 ICMA Local Sustainability Program Survey data, we characterize 953 local governments' sustainability strategies based on whether their design is more focused or comprehensive. We then assess how community constituents and the external environmental setting are related to local governments' pursuit of one sustainability strategy over another. Our findings show that local governments that develop a comprehensive sustainability strategy are more likely to have stronger influences from new economy industry constituents, environmental NGOs, and disaster risk associated with winter storms. By contrast, local governments' pursuit of a focused sustainability strategy is related to their geological hazard risk.

This research broadens our understanding of local governments' strategic approaches by considering their suites of sustainability practices and how variations in the design of these sustainability practices form at least two higher-level strategies – focused or comprehensive. Second, this research suggests that local governments which pursue comprehensive sustainability strategies with longer-term sustainability goals (Yanarella and Levine 2008) and that focus on a broader array of complex environmental issues (Daley et al. 2013; Sharp et al. 2011) appear to be influenced by community constituents and their external environmental setting in a way that other local governments are not.

2. Design of local governments' sustainability strategies

An organization's strategy is a distinctive pattern of practices that it implements to achieve a broad set of goals (Porter 1980). Managers make decisions about the goals that they aim to achieve and how their organizational practices should be formulated for the desired objectives (Boyne and Walker 2004;

Bantel 1998; Porter 1980). While analyzing their external circumstances and identifying latent opportunities and threats (Boyne and Walker 2004), they determine the scope of practices that their organizations implement and the types of resources that get allocated towards implementation (Gupta et al. 2006). These managerial decisions shape organizational strategies, leading to distinctive patterns in an organization's practices (Enticott and Walker 2008). Across all organizations, strategy often differs in its scope (Gupta et al. 2006; Porter 1980) and is either more focused or more comprehensive (Auld 2014; Bantel 1998; Porter 1980).

An organization that pursues a *focused strategy* concentrates its resources on practices to address a single concern (Auld 2014; Porter 1980). A focused strategy involves pursuing existing, well-known practices (Katila and Ahuja 2002), or niche practices that offer certain organizational benefits (Bantel 1998; Porter 1980). Organizations that pursue a focused strategy also tend to have established capacities in place that help assure their performance outcomes (Auld 2014).

Related to local governments' sustainability efforts, sustainability strategy is the pattern of practices that a local government implements with the goal of addressing environmental concerns (Ji and Darnall 2018). Within local governments, these strategies are often developed somewhat autonomously from federal or state influence since implementing sustainability practices at the local level typically is neither mandated nor financed by upper level of governments (Krause et al. 2016). Local governments that pursue a *focused sustainability strategy* develop sustainability practices that concentrate their expertise and resources around a narrow set of environmental issue areas. Some local governments utilize established technologies with guaranteed cost savings (Ji and Darnall 2018) especially in the short term. An example includes improving energy efficiencies in public facilities (Bae and Feiock 2013). Other local governments focus on addressing the certain environmental issues that have urgency and salience (Yanarella and Levine 2008; Wild River 2005; Zeemering 2009), such as improving drought tolerance via sustainable land use. In either case, local governments carefully select a few environmental issue areas that involve well-known solutions or benefits and develop their sustainability practices around the narrowly selected environmental issues (Ji and Darnall 2018). Their focused sustainability strategies enable local governments to achieve clearly measurable (Maletič et al. 2014) and recognizable progress in their focused areas.

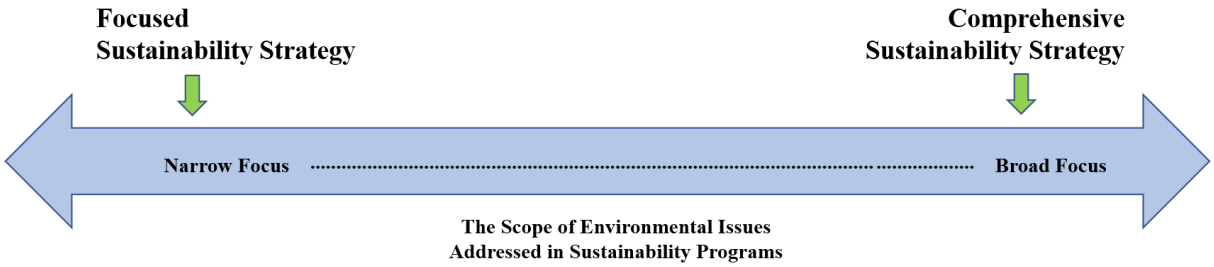
By contrast, an organization that pursues a *comprehensive strategy* distributes organizational resources across a wide array of concerns (Bantel 1998; Gupta et al. 2006; Porter 1980). A comprehensive strategy involves a broad set of practices that are carefully designed by accounting for synergetic interactions among concerns (Auld 2014). Designing these practices requires that organizations develop a variety of highly specialized organizational skills and competencies (Gupta et al. 2006). They also require that organizations develop cultures that are open to challenging existing routines/operations in order to respond to ever-shifting conditions and that can adapt quickly to new circumstances (Porter 1980). These organizations therefore are able to anticipate future conditions in the external setting which can create first-mover advantages (Bantel 1998).

Applied to the local government setting, local governments that pursue a *comprehensive sustainability strategy* design their sustainability practices across a relatively broad array of environmental issues (Ji and Darnall, 2018; Yanarella and Levine, 2008). Such a strategy tends to involve more coordinated action (Zeemering 2009) because the practices are more complexly related across multiple pathways (Maletič et al. 2014; Ji and Darnall, 2018). Examples include improvements to community health and well-being, cultural vitality, and quality of life (Portney 2003).

These strategies are often scaled to address more regional environmental issues (Jenkins, Annandale, and Morrison-Saunders 2003), such as transportation, air quality, and water. Local governments therefore need to broaden their organizational skills and competencies for coordinated action across governmental departments, as well as between government and organizations in the private sectors (Auld 2014). For these reasons, implementing a comprehensive sustainability strategy may pose

significant challenges and burdens for local governments (Zeemering 2009), but can lead to fundamental solutions to sustainability problems (Ji and Darnall, 2018; Krause et al., 2016; Portney 2003). Figure 1 describes these two strategies.

Figure 1. Local Governments' Focused Versus Comprehensive Sustainability Strategies.



We propose that local governments tend to pursue one strategy over another based on their external conditions (Boyne and Walker 2004) that include community constituents and the environmental setting.

3. External conditions and the design of local governments' sustainability strategies

External conditions that affect local governments include outside forces, factors, and institutions (Daley et al. 2013; Zahran, Grover, Brody and Vedlitz 2008). Local governments are said to be effective to the extent that they adapt and respond to their external conditions (Buller and Mcevoy 2016). Related to the design of a local government's sustainability strategy, two external conditions are particularly salient: community constituents (Daley et al. 2014; Elsbach 1994; Hawkins et al. 2016; Rindova and Fombrun 1999) and the environmental setting in which a local government is embedded (Pitt 2010; Sharp et al. 2011; Zahran et al. 2008).

3.1. Community constituents

Community constituents "refer to who exerts demands" on a local government directly or indirectly, including residents, agencies (Kmec and Skaggs 2009 p.50) or industries (Elsbach, 1994). Constituents exert varying degrees of influences on local governments (Logan and Molotch 2007), based on their lobbying interests and ability to mobilize public sentiment (Copper, Nownes and Roberts 2005). Community constituents often view sustainability in terms of the trade-offs between environmental sustainability and economic development (Daley et al. 2013) and tend to be tilted to one side over another according to power dynamics of community constituents in urban politics (Logan and Molotch 2007). Local governments develop government practices in response to their community constituents (Krishna 2003; Krause et al. 2016). We suggest that three community constituents are

particularly salient to the design of a local government's sustainability strategy: heavy polluting industry constituents (Daley et al. 2013; Zahran 2008), new economy industry constituents (Krueger and Gibbs 2007) and environmental NGO constituents (Sharp et al. 2010).

For decades*, heavy polluting industry constituents* have played a significant role in shaping community interests in urban economic growth (Logan and Molotch 2007). Heavy polluting industries, such as steel, chemical, and paper products industries, emit more air, water and heavy metal pollutants than other industries (Mani and Wheeler, 1998). They are characterized by their low labor-intensity and high reliance on capital investments (e.g. machinery) (Mani and Wheeler 1998). They also tend to generate environmental impacts across a variety of areas, from consuming significant quantities of raw materials (e.g. coal, lumber, water) to destroying natural habitats (Mobus 2005). Due to their adverse impacts on the natural environment, and to avoid scrutiny, heavy polluting industries (Mobus 2005) often seek to constrain local governments' environmental protection efforts by engaging in political campaigns or lobbying (Logan and Molotch 2007). They are also less likely to support local governments' community-wide sustainability strategies (Bae and Feiock 2013; Daley et al. 2013) that promote citizen awareness and influence social norms in favor of environmental protection (Mobus 2005). Therefore, local governments with a greater presence of heavy polluting industry constituents in their communities are more likely to develop a focused sustainability strategy (Bae and Feiock 2013).

Hypothesis 1) *Local governments with more heavy polluting industry constituents are more likely to design focused sustainability strategies.*

By contrast, *new economy industry constituents* have advocated the need for creating environmentally sustainable community for urban economic growth (Florida 2005). New economy industries consist of emerging science and technology businesses (Hirsch 2001; Krueger and Gibbs 2007), particularly those related to information and communications technologies (Daley et al. 2013; Florida 2005). The interests of these businesses differ from the heavy polluting industries because new economy industries generate relatively little pollution. They also depend on recruiting and retaining workers who are creative, well-educated and mobile (Florida 2005). Workers in these industries tend to seek communities that offer a better quality of life (Krueger and Gibbs 2007), including a cleaner environment and an urban setting that is more environmentally friendly (Bulkeley and Betsill 2013). New economy industries therefore have incentives to pressure governments for economic growth policies that are compatible with greater environmental protections (Florida 2005). For these reasons, local governments with more new economy industry constituents in their communities are more likely to pursue a comprehensive sustainability strategy (Bae and Feiock 2013; Daley et al. 2013).

Hypothesis 2) *Local governments with more new economy industry constituents are more likely to design comprehensive sustainability strategies.*

Environmental NGO constituents are organized forms of civil society that operate without profit-seeking objectives and fill the public space between individual citizens and the state (Lane and Morrison, 2006). Environmental NGOs work closely with individual citizens (Lane and Morrison, 2006) to educate them about the environmental risks in their communities and mobilize the broader public in favor of environmental protection (Eikenberry and Kluver 2004). With their own competencies, information and civil capacity, environmental NGOs assist local governments by advising (Zeemering 2009) and encouraging them to develop sustainability practices that offer long-term benefits (Daley et al. 2013). These entities often expect local governments to pursue sustainability strategies that offer broader public benefits associated with a cleaner environment (Daley et al. 2013).

In response, local governments are more likely to pursue a comprehensive sustainability strategy (Daley et al. 2013).

> ***Hypothesis 3)*** *Local governments with more environmental NGO constituents are more likely to design comprehensive sustainability strategies.*

3.2. Environmental setting

The environmental setting consists of conditions within the natural environment that impact communities (Cuffney et al. 2005). Local governments are likely to assess their environmental setting when designing their sustainability strategies (Zahran et al. 2008). Two types of environmental settings are particularly relevant: disaster risk (Solecki, Leichenko, and O'Brien 2011; Zahran et al. 2008) and poor environmental quality (Kahn 2000; Pitt 2010; Wechsler and Backoff 1986).

Disaster risk is the extent to which a local area is vulnerable to adverse impacts of disasters associated with natural hazards and extreme weather events (Godschalk 2003). Hurricanes, floods, storms, and other natural hazards have increasingly imposed risks to human lives and the well-being of communities (Solecki et al. 2011). Economic losses from natural disasters are also significant (Godschalk 2003). Moreover, disaster risk is expected to grow substantially as climate change increases the intensity and frequency of the natural hazards (Cutter 2014).

Organization strategy scholars have argued that organizations pursue different strategies in response to external risk (Covin and Slevin, 1989). A focused strategy is low-risk in nature (Covin and Slevin, 1989) in that it concentrates organizational resources on narrowly selected areas where organizations can ensure predictable (but modest) performance outcomes (Hart and Milstein, 2003; Kurapatskie and Darnall, 2013). In the presence of high risk in the external environment, organizations tend to avoid achieving broad and fundamental changes by conducting extensive implementation efforts (Porter and Kramer, 2006). Related to sustainability strategies, the presence of high disaster risk may urge local governments to seek greater certainty and assurance from their sustainability efforts (Ji and Darnall 2018). In response, local governments are more likely to design a focused sustainability strategy that concentrates on the areas where they can alleviate the immediate challenges from disaster risk.

> ***Hypothesis 4b)*** *Local governments in areas with greater disaster risk are more likely to design comprehensive sustainability strategies.*

By contrast, it is also possible that local governments may respond to their community's high disaster risk by developing sustainability practices that focus on the long-term (Cutter 2014; UNISDR 2015). A comprehensive strategy takes high-risk into account (Ji and Darnall 2018) as it often entails greater uncertainty about tangible performance outcomes in short term (Porter and Kramer 2006). Organization strategy scholars have pointed out that some pioneering organizations are likely to seek to enhance their organizations' reputation within its community and peer networks (Porter and Kramer 2006) by making significant strides in performance outcomes. These organizations perceive the external risk factors as potential opportunities to create significant improvements in their organizations through innovative changes (Hart and Milstein 2003).

Related to sustainability, local governments may consider disaster risk as an opportunity to make a broader environmental and social changes in their communities, which will in turn make their communities to be more resilient to disaster risk (Cutter 2014). Indeed, these sustainability efforts can help mitigate natural disaster risk in their communities (Schneider 2005; Tobin 1999). To do so, local

governments mitigate multiple types of natural disaster risk, including ecological (e.g. lack of green spaces and wetlands), social (e.g. social injustice), and economic (e.g. urban sprawl) attributes (Tobin 1999). Sustainability is often a guiding principle for hazard mitigation (Cutter 2014; Tobin 1999) because it addresses both community social vitality and climate change adaptation (Schneider 2005). Therefore, local governments facing greater disaster risk in their communities may have a greater motivation to design comprehensive sustainability strategies that serve dual objectives of both sustainability and hazard mitigation (Godschalk 2003).

Hypothesis 4b) *Local governments in areas with greater disaster risk are more likely to design comprehensive sustainability strategies.*

Local communities experience varying levels of environmental quality (Kahn, 2000), with some experiencing *poor environmental quality*. Poor environmental quality is closely related to community health (Kahn 2000) and relocation of business and residents (Graves and Waldman 1991; Fowler 2016). It affects economic development by discouraging tourism and recreation (Fowler 2016) and attracting unwanted media attention that stigmatizes the local communities (Bush, Moffatt and Dunn 2001). Examples include smog and high ozone days. In such communities, citizens become increasingly supportive of environmental protection and pressure for policies that reflect their environmental attitudes. In response, local governments in these communities are more likely to consider sustainability in their development plans (Conroy and Berke 2004) and place sustainability-related policies on the local political agenda (Fowler 2016). These factors also increase local governments' probability of adopting a proactive approach that addresses wider array of environmental issues that include climate change mitigation (Bulkeley 2000; Pitt 2010) and regional air quality improvements (Potoski and Woods 2002). For these reasons, we suggest that local governments in areas with poorer environmental quality may have greater economic and political motivations (Fowler 2016) to address their poor environmental quality by developing comprehensive sustainability strategies.

Hypothesis 5) *Local governments in areas with poorer environmental quality are more likely to design comprehensive sustainability strategies.*

4. Methodology

4.1. Data

To examine the factors associated with local governments designing a focused or comprehensive sustainability strategy, we rely on data from International City/County Management Association's (ICMA's) Center for Sustainable Communities. The data were created from ICMA's Local Government Sustainability Policies and Practices survey, which questioned sustainability managers in all municipal governments having at least 2,500 residents (Svara 2011). Managers were asked about their local government's sustainability practices. The data contains information for 119 categories of sustainability practices. A total of 1,874 municipalities responded to the survey for a response rate of 25.4 percent (Svara 2011).

We coupled the survey data with data from four sources: U.S. Census, National Charitable Center Statistics (NCCS) core files for Public Charity organizations, Spatial Hazard Events and Losses Database for the United States (SHELDUS), and EPA's Green Book. After the data merge, a total of 953 municipal governments remained in the sample.

To check the generalizability of municipalities in our sample, we compared our sample to entire municipalities listed in U.S. Census's American Community Survey (ACS). According to 2010 ACS, there are total 9,781 municipalities in the U.S. that have at least 2,500 residents. In terms of demographic characteristics, our sample municipalities are larger (81,362 residents), slightly less affluent ($69,640 median household income), and less White American (74.17 percent) compared to the population municipalities having, on average, 21,615 residents, $70,390 median household income, and 79.40 percent White American residents. Second, related to geographical representativeness, the sample covers municipalities in all 50 states while not including Washington DC. Disproportionately fewer municipalities are from Northeast (8.05 percent) and South (31.49 percent) regions whereas more municipalities are from Midwest (34.05 percent) and West (26.36 percent), which account for 18.8 percent, 36.32 percent, 24.47 percent and 20.39 percent in population municipalities respectively[1]. Taken together, our sample municipalities may be more representative of medium and large municipalities located in Midwest and West regions.

4.2. Measures

4.2.1. Dependent variable

To assess whether or not the design of local governments' sustainability strategies was more focused or comprehensive, we measured the breadth of environmental issues that they addressed in their sustainability practices. We did so by relying on the 2010 ICMA Local Government Sustainability Policies and Practices survey. The survey included a list of 119 different sustainability practices. Sustainability managers were asked to indicate which of the 119 environmental and social practices are implemented by their local governments. Respondents reported 'Yes' (1) or 'No' (0) for each sustainability practice (e.g. use of grey-water system, recycling of household hazardous waste, installing charging stations for electric vehicles, etc.). Although the list is not exhaustive, it represents a significant array of sustainability practices that are reported to be in implementation by local governments (Svara 2011).

The ICMA categorized the 119 sustainability practices into eight environmental issues: air, water conservation, recycling, energy conservation, green buildings, sustainable land use, transportation, and social inclusion. We disaggregated them based on their specific goals and target populations. For example, energy conservation can be achieved by implementing sustainability practices that encourage energy saving behaviors of different target populations, such as government employees, businesses and residents. Local governments can also reduce energy usage by replacing public facilities (e.g. streetlights) and vehicles with more energy-efficient ones. Furthermore, environmental impacts associated with energy usage can be prevented at the source if local governments adopt alternative energy sources for energy generation. While these sustainability practices are commonly designed to achieve overall energy conservation within a city, they are distinctive in that they target different populations (Bae and Feiock 2013; Daley et al., 2013) and achieve different goals (e.g. reducing energy usage once it is generated versus generating energy that have little environmental impacts from the source) (Ji and Darnall 2018). Disaggregating a broad environmental issue according to specific goals and target populations is important because comprehensive sustainability strategies address more aspects of the energy conservation than a focused approach that addresses one or two aspects. In disaggregating energy conservation based on the specific goals and target populations, we identified five types of energy practices: energy saving in government, energy saving in residential homes, energy saving in business, energy saving in outdoor lights/vehicles, and alternative energy generation.

[1] More detailed comparative descriptive statistics between our sample and population municipalities will be provided upon request.

Similarly, transportation issues were sorted based on specific goals: whether sustainability practices aim to encourage to use public transits, provide alternative modes of vehicles that have little environmental impact, or reduce the need of commute trip itself. This step led to three types of transportation issues: public transportation, alternative modes of vehicles (e.g., walk, bike), and reduced commute trips (e.g., telework, compressed work week).

Table 1 shows distribution of the 119 sustainability practices across the 14 environmental issues, with descriptive statistics for the number of adopted practices by our sample municipal governments. As shown in Table 1, the disaggregation process led to more even distribution of sustainability practices across 14 environmental issues than the ICMA's original 8 environmental issue categories do. The more finely tuned environmental issue categories enabled us to more accurately examine how local governments' sustainability practices are distributed across the defined environmental issue areas.

Table 1. Number of Sustainability Practices Across Environmental Issues

Environmental Issues		Total	Number of Practices Adopted			
			Mean	S.D.	Min	Max
Air		8	1.16	1.48	0	8
Water conservation		6	1.70	1.61	0	6
Recycling		9	4.11	2.25	0	9
Energy	Government	6	2.83	1.88	0	6
	Residential homes	13	0.80	1.19	0	5
	Business	12	0.22	0.77	0	4
	Outdoor lights/vehicle	9	2.18	1.94	0	9
	Alternative energy generation	9	0.44	0.82	0	5
Transits	Public transportation	5	0.78	1.00	0	5
	Alternative modes of vehicles	12	0.67	1.07	0	5
	Reduced commute trips	3	2.49	1.81	0	3
Green buildings		8	0.77	1.21	0	7
Sustainable land use		11	1.49	1.61	0	9
Social inclusion		8	1.98	2.17	0	8

For each local government, we measured the extent to which its sustainability practices were broadly distributed across these 14 environmental issues by using Shannon's H entropy score. The formula for calculating the breadth of environmental issues is as follows (Ji and Darnall 2018):

$$\text{Entropy Score} = \sum_{i=1}^{m} P_i * \ln(1/P_i)$$

where P_i is calculated by a number of sustainability practices addressing ith environmental issue divided by total number of sustainability practices adopted by a local government; m is the number of environmental issue categories (e.g., 14 in this case). A greater breadth of environmental issues addressed by local practices, a higher the entropy score for their sustainability practices.

Figure 2 describes spatial distribution of our sample municipalities. When categorizing municipalities according to their entropy scores for the breadth of environmental issues that they address in their sustainability practices, municipalities in the top 25 percentile are colored in dark in Figure 2.

4.2.2. Explanatory variables

Community Constituents. Heavy polluting industry constituents were measured by the number of individuals employed in manufacturing sector within each locality. The manufacturing industry is a common proxy for heavy polluting industries (Bae and Feiock 2013; Daley et al. 2013; Portney 2003). The manufacturing industry comprises businesses that engage in the mechanical, physical, or chemical transformation of materials, substances, or components into new products (NAICS 2016). Combined, they account for 40% of the U.S.'s sulfur dioxide emissions, 60% of water pollution, 75% of non-hazardous waste and 90% of hazardous waste (Jones and Klassen, 2001) and are the most polluting industries in the U.S. (Mani and Wheeler 1998). We used NAICS industry codes and 2010 Census data to determine the total number of employees in manufacturing industry (Kahn 1999). We then standardized the total number of employees by every 1,000 residents in the locality and took the natural logarithm.

Figure 2. Distribution of Sample Municipalities Across the U.S

Similarly, new economy industry constituents were measured by the total number of employees in information technology (IT) industry. The IT industry has been used as proxy for the new economy industry because it is a low pollution industry and advocates for how sustainability can fuel economic growth (Florida 2005; Hirsch 2001). We measured the number of employees working in the IT industry using NAICS industry codes and 2010 Census data. The total number of employees was standardized by every 1,000 residents in the locality and transformed into the natural logarithm.

Environmental NGO constituents were measured using data from the National Center for Charitable Statistics (NCCS) core files to determine the number of environmental nonprofit organizations in a locality. A more appropriate measure for environmental NGO constituents may be the total number of employees working in environmental NGOs, which is also more consistent with our industry constituent measures. However, due to a missing value problem in the employee data (Fischer, Gordon and Kraut 2002), we have relied on the number of nonprofit organizations whose primary activities are for environmental quality protection as categorized by the National Taxonomy of Exempt Entities code. The number of environmental NGOs was then transformed by taking the natural logarithm.

Environmental Setting. Disaster risk was measured as the property damages from natural hazard events from 2005 to 2010 in a given local area (Zahran et al. 2008). FEMA has categorized natural hazards into atmospheric (tropical storms, winter storms, tornadoes, etc.), hydrological (e.g. flooding, storm surge, coastal erosion) and geological (landslides, earthquakes) hazards, and identifies each type of natural hazard as being triggered either by meteorology, water, or earth. Different types of natural hazards may lead to different patterns in their damages and impacts on the community and therefore require different approaches to hazard mitigation efforts and sustainability strategies. For example, tropical hurricanes and storms may require local governments to preserve wetlands, address storm water run-offs, and build resilient, sustainable buildings to address flooding and strong wind issues. By contrast, winter storms may require local governments to prepare for freezing and blizzards that often lead to road blockages and heavy weight burden on roofs. To account for how natural hazard risk is related to the design of local governments' sustainability strategies, we categorized natural hazards based on their consequent impacts rather than their causes: water-related, winter storm, and geological hazards.

Water-related hazard risk was measured by the aggregated property damage losses (2005-2010) associated with severe storm, hurricane/tropical storm, and flooding by relying on the Spatial Hazard Events and Losses Database for the United States (SHELDUS) and its category for natural hazards. Second, using the same database, winter storm hazard risk was measured as the aggregated property damage losses between 2005 and 2010 associated with winter storms and avalanche. Finally, using SHELDUS data, we measured geological hazard risk by the aggregated property damage losses (2005-2010) associated with landslides. Since the disaster loss information was available only at the county level, for municipalities, we extrapolated values from the county where a municipal government is located. We then divided the total amount of disaster losses by the total number of residents and transformed the variable into natural logarithm form.

In order to measure poor environmental quality in a given locality, we focused on air quality because it is one of the most publicly visible and salient environmental conditions (Kahn 1998). We measured poor air quality by examining whether a locality was located within a nonattainment area for any of six criteria pollutants defined in the National Ambient Air Quality Standards (NAAQS). These data were extracted from the Environmental Protection Agency's Green Book on Nonattainment Area for Criteria Pollutants. Frequency of being listed as nonattainment areas between 2005 and 2010 was aggregated and then transformed into the natural logarithm form. Since the nonattainment information is available only at the county level, for municipalities, we extrapolated values from the county where the municipal government was located.

4.2.3. Control Variables

We included control variables related to local governments' internal fiscal and human resources, capacities (arising from networks, administrative responsibility, and governmental form), and

community characteristics. *Fiscal resources* relate to whether governments acquire revenues from their own sources (e.g. tax, charges and fees) or intergovernmental transfers (Ji, Ahn and Chapman 2016). Local governments with greater own-sourced revenues often have greater autonomy, vitality, and capacity for decentralized decision-making (Wang et al. 2012). We calculated fiscal resources by the percentage of the own source revenue in each local government's total general revenue. These data were obtained from the U.S. Census Bureau's 2007 Government Finance data that includes information about each local government's revenues and expenditures from different sources.

Human resources in local governments include public employees who have practical knowledge about environmental issues in the community (Hawkins et al. 2016). These individuals are responsible for putting sustainability strategies into practice (Hawkins et al. 2016) because they are an internal source of knowledge and information about environmental issues (Krause et al. 2015). A local government's human resources were measured by the number of public employees focused on environmental concerns (Daley et al. 2013; Wang et al. 2012). Data from the 2007 U.S. Census Bureau Local Government Employment and Payroll were used to determine the number of local government employees working in areas of natural resources, park and recreations, public welfare, health, solid waste management, and public utilities. This number was divided by the total number of public employees in the municipal government.

Some local governments have developed extensive *external networks with professional associations*. The International Council for Local Environmental Initiatives (ICLEI) is one of the most influential networks that assist local governments' sustainability initiatives (Yi et al. 2017). It provides member local governments with information, technical and financial assistance for their sustainability efforts (Krause et al. 2015). To account for local governments' external network, we determined whether or not they had an ICLEI membership (coded 1, 0 otherwise) by relying on ICMA (2010) data.

Local governments that have *administrative responsibility over water service*, compared to those local governments without the responsibility, are likely to be in a better position to develop technical and administrative skills needed to manage complex environmental issues (Wallsten and Kosec 2008). Water is one of the most complex environmental issues in that the responsible providers are expected to address not only water pollutants for clean and safe water (Wallsten and Kosec 2008), but also other related environmental issues, such as water shortages and storm water run-off. Moreover, not all of the local governments in the U.S. have the responsibility for water service provision (Bel and Warner 2008), which may lead to variation in sustainability-specific expertise among local governments. Administrative responsibility for water service was coded 1 if the local government had the responsibility, otherwise 0 by relying on data from ICMA 2010 survey.

A local government's form – either appointed manager or elected mayor – affects the authority over government affairs and a local government's sustainability strategy (Bae and Feiock 2013). Compared to elected mayors, who have authority delegated directly by constituents, appointed managers exercise relatively constrained authority over certain operational issues (e.g. staffing, budgeting) (Nelson and Svara 2012), which may influence the design of a local government's sustainability strategy. In order to control different forms of local governments, we relied on an ICMA survey item that asked about the form of local government. The local government form was coded 1 for the appointed manager (council-manager) form, otherwise coded 0.

Community characteristics often relate to the level of public support for environmental sustainability (Zahran et al. 2008) and therefore may influence local governments' sustainability strategies. We control for median household income (transformed into a natural logarithm form) and the proportion of *White American residents* because income and race are often associated with a community's interest in environmental quality (Edward and Darnall 2010). These data were drawn from the 2010 Census data.

Metropolitan status also affects local governments' sustainability efforts because more urbanized localities have more complicated environmental problems (Bae and Feiock 2013; Daley et al. 2013; Hawkins et al. 2016). Even within a metropolitan area, central cities, compared to suburban cities, are more likely to face greater pressures to engage in metropolitan-wide environmental planning (Pitt 2010) because of their transboundary air quality and transit issues. Indeed central cities tend to implement more sustainability practices than suburban and rural cities (Homsy and Warner 2015; Swann and Deslatte 2019). To control for the metropolitan status of municipal governments, we include *urban* area, which was coded 1 if a local government is a central city in a metropolitan area, otherwise 0 (Homsy and Warner 2015; Swann and Deslatte 2019). *Rural* area was coded 1 if a local government is located outside of metropolitan areas, otherwise 0. Local governments' locations in *suburban* cities, defined as non-central cities located in metropolitan areas (Homsy and Warner, 2015), are excluded from the analysis as a reference group. The information is drawn from the ICMA survey.

Finally, state governments influence local governments legally and financially (Saha and Paterson 2008). We controlled for state influences by including *state dummy variables*.

Table 2 reports descriptive statistics and correlations for each of the variables included in the analysis.

4.3. Empirical Model

To empirically examine our research hypotheses, we relied on a quantile regression model. A quantile regression analysis estimates conditional distributions of the dependent variable at different quantiles (i.e.,10th, 25th, 50th, 75th and 90th quantiles)[2] as a function of the explanatory variable (Buckinsky 1998). Since we are interested in variations in the design of local governments' sustainability strategies, the quantile regression will allow us to estimate how independent variables are associated with local governments that have different propensities (Killewald and Bearak 2014) to design their sustainability practices broadly or more narrowly, given their covariate values.

This technique is especially suitable for our research focus on the heterogeneous groups of local governments at the two ends of the conditional distributions of the entropy score. For example, local governments distributed at the lower conditional distribution of the entropy score (i.e., the 10th and 25th quantile) are local governments that design their sustainability practices in a more focused way across a narrow set of environmental issues than they would have otherwise given their covariable values. By contrast, local governments distributed at the higher conditional distribution of the entropy score (i.e., the 75th and 90th quantile) are local governments that design their practices more comprehensively across a broad set of environmental issues.

[2] Conditional distributions of the dependent variable mean that the observations at high quantiles have higher dependent variable scores, given their covariates, but do not necessarily mean high dependent variable scores in an absolute sense (Killewald and Bearak 2014).

Table 2. Descriptive Statistics and Correlations

	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)	14)	15)	16)
1) Heavy polluting industries	1.00															
2) New economy industries	-0.02	1.00														
3) Environmental NGOs	-0.20	0.15	1.00													
4)Storm/Hurricane/Hydrological hazard risk	0.03	-0.05	-0.07	1.00												
5) Winter storm risk	0.09	-0.02	-0.05	0.15	1.00											
6) Geological hazard risk	0.00	-0.08	-0.06	0.10	0.12	1.00										
7) Poor environmental quality	0.01	0.23	0.00	0.00	-0.12	-0.17	1.00									
8) Fiscal resource	-0.01	0.20	0.14	-0.05	0.08	-0.12	0.12	1.00								
9) Human resource	-0.10	0.09	0.14	-0.10	0.00	-0.09	0.02	0.14	1.00							
10) Membership with ICLEI	-0.15	0.17	0.40	-0.08	-0.06	-0.21	0.09	0.09	0.17	1.00						
11) Administrative responsibility	0.08	-0.17	-0.01	0.03	0.06	0.13	-0.20	-0.04	-0.05	-0.09	1.00					
12) Household income	-0.04	0.37	0.07	-0.04	-0.04	-0.22	0.45	0.28	0.13	0.20	-0.22	1.00				
13) White American race	0.18	0.06	-0.11	0.08	0.08	0.14	-0.23	-0.10	-0.22	-0.19	0.04	0.07	1.00			
14) Government form	-0.10	0.09	0.12	-0.12	-0.04	-0.06	0.12	0.24	0.13	0.12	0.02	0.12	-0.16	1.00		
15) Urban	-0.10	0.04	0.50	-0.11	-0.07	-0.02	-0.01	0.04	0.11	0.27	0.01	-0.11	-0.23	0.09	1.00	
16) Rural	-0.03	-0.30	-0.10	0.19	0.06	0.15	-0.46	-0.20	-0.08	-0.19	0.19	-0.47	0.18	-0.14	-0.29	1.00
Mean	3.83	2.18	1.00	-0.05	0.03	-0.27	1.03	0.83	0.11	0.15	0.73	11.09	0.73	0.70	0.16	0.30
Standard deviation	0.69	0.78	1.02	2.31	1.19	1.30	1.19	0.15	0.09	0.35	0.44	0.38	0.21	0.46	0.37	0.46
Min	-1.41	-0.74	0.00	-6.21	-6.66	-8.87	0.00	0.21	0.00	0.00	0.00	10.30	0.03	0.00	0.00	0.00
Max	5.28	4.28	5.36	15.02	12.03	8.65	3.83	1.00	0.77	1.00	1.00	12.68	1.00	1.00	1.00	1.00

Correlations > |.06| are statistically significant at $p<.05$

By emphasizing different propensities of local governments, we are able to assess how external conditions are associated with local governments that design either a more focused or comprehensive strategy.

We estimate the coefficients of the explanatory and control variables associated with 10th, 25th, 75th, and 90th quantiles of the breadth of environmental issues. Since some of our independent and control variables are measured at the county level (e.g. disaster risk, poor environmental quality), we estimated standard errors to be adjusted for the county level (Abadie, Athey, Imbens and Wooldridge 2017)[3]. The 10th quantile's coefficients, for example, could be interpreted as the marginal effects of given explanatory variables on the breadth of environmental issues in local governments' sustainability practices at the 10th conditional quantile (i.e., those local governments with extremely low propensities to address environmental issues broadly).

As a robustness check, we consider that the ICMA survey includes a comprehensive set of U.S. municipalities having at least 2,500 residents. Previous studies examining local governments' sustainability practices have generally focused on large municipalities (Berry and Portney 2013; Wang et al. 2012) because small municipalities often lack organizational capacities and resources to allocate towards implementing sustainability practices (Homsy and Warner 2015), and therefore are less likely to have a sustainability strategy, regardless of their external conditions. Therefore, our findings may be confounded by including small municipalities in our analysis. We thus rerun our model by excluding municipalities with less than 10,000 residents (n = 646) to determine whether our results are sensitive to municipality size.

5. Results

Table 3 compares the quantile regression results for the breadth of environmental issues that local governments address in their sustainability practices relative to five quantiles: the 10th, the 25th, the 50th, the 75th and the 90th quantiles. The pseudo R-squares for the different quantiles ranged from 22.8 percent to 25.2 percent, indicating the model had reasonably good fit.

Related to community constituents, having more heavy polluting industry constituents in the community is associated with a decrease in the breadth of environmental issues in local governments' sustainability practices (see Table 3). However, their negative impacts are not statistically significant at all quantile distributions. By contrast, having more new economy industry constituents in the community is associated with an increase in the breadth of environmental issues in local governments' sustainability practices at all quintiles of local government distribution ($p<0.01$ – $p<0.05$), except for local governments at the 10th quantile. Having more environmental NGO constituents in the community is associated with an increase in the breadth of environmental issues addressed in local governments' sustainability practices at all quantiles ($p<0.10$ – $p<0.01$), except those local governments at the 90th quantile. Overall, these findings provide evidence in support of Hypothesis 2 and 3, but they fail to provide evidence in support of Hypothesis 1.

Related to environmental setting, disaster risk in the community has varying associations with the breadth of environmental issues local governments address in their sustainability practices at different conditional quantiles. In general, greater water-related hazard risk is associated with a lower breadth of environmental issues, but it is not statistically significant at all quantiles. Greater winter storm risk is associated with a greater breadth of environmental issues for local governments at 75th and 90th quantiles ($p<0.10$ – $p<0.01$). However, the winter storm risk is negatively associated with the breadth of environmental issues for the local governments at lower quantiles (e.g. 10th and 25th quantiles) while

[3] The county-level clustered standard errors will account for clustering of municipal governments and the possible correlation in unobserved components of their dependent variable values within a county (Abadie et al. 2017).

the negative relationship is not statistically significant. Similarly, greater geological hazard risk is positively associated with a greater breadth of environmental issues for the local governments at 50th and 75th quantiles ($p<0.10$), but it is associated with a lower breadth of environmental issues for the local government at the 10th quantile ($p<0.05$).

Poorer local environmental quality is associated with an increase in the breadth of environmental issues in local governments' sustainability practices except for the local government at the 10th quantile. However, the effect is not statistically significant for the local governments at all quantile distributions. Taken together, these results provide evidence in support of Hypothesis 4a and 4b, but no evidence in support of Hypothesis 5.

Related to our control variables, more fiscal resources are associated with an increase in the breadth of environmental issues in local governments' sustainability practices, but only for those local governments at the 75th quantile ($p<0.05$). Similarly, human resources are associated with an increase in the breadth of environmental issues for local governments at the 75th and 90th quantile only ($p<0.10$ – $p<0.05$). Local governments having membership with the external network, ICLEI, and administrative responsibility for water services is associated with an increase in the breadth of environmental issues addressed in their sustainability practices, for local governments at all quantiles ($p<0.10$ – $p<0.01$). Having a greater proportion of White Americans is associated with a decreased breadth of environmental issues in local governments' sustainability practices for all quantile distributions ($p<0.05$ – $p<0.01$), except those local governments at the 10th quantile. The local government form of appointed mangers is associated with an increase in the breadth of environmental issues, for local governments at all quantiles ($p<0.05$ – $p<0.01$). Finally, governments in central city metropolitan areas are more likely to design sustainability practices across a broader set of environmental issues, compared to suburban governments in metropolitan areas ($p<0.05$ – $p<0.01$), except for local governments at lower quantiles (e.g. 10th and 25th quantiles).

Overall, we found some empirical evidence for significant influences of community constituents and the environmental settings on local governments' pursuits of sustainability strategies. To assess whether these findings may be confounded by including small municipalities in our analysis, as a robustness check, we reran our model by excluding municipalities with less than 10,000 residents ($n = 646$). The results are presented in Table 4 and are generally consistent with the results from the full sample.

The negative relationship that heavy polluting industry constituents have on the breadth of environmental issues becomes significant ($p<0.05$) in the large municipality sample, but only for the local governments at the extremely high conditional distribution of the entropy score (e.g. 90th quantile). The results are consistent across both samples for new economy industry ($p<0.01$ – $p<0.10$) and environmental NGO constituents ($p<0.05$ – $p<0.01$) in that they are associated with an increase in the breadth of environmental issues for the local governments at almost all quantile distributions.

The findings are generally similar for disaster risk. Winter storm risk is associated ($p<0.01$ – $p<0.05$) with a greater breadth of environmental issues for the local governments at the 50th and 90th quantiles. Geological hazard risk remains associated with a lower breadth of environmental issues for the local governments' sustainability practices at the 10th quantile ($p<0.05$), but its influence is no longer significant for the local governments at higher quantiles. Overall, the results from the more restricted municipality sample offer generally consistent findings about the relevance of community constituents and environmental setting on local governments' sustainability strategies.

Table 3. Quantile Regressions Predicting the Breadth of Environmental Issues – All Municipalities

	More focused								More comprehensive	
	10%		25%		50%		75%		90%	
External Organizational Setting										
Community Interests										
Heavy polluting industries	-0.058	(0.091)	-0.005	(0.044)	-0.008	(0.023)	-0.026	(0.017)	-0.025	(0.016)
New economy industries	0.062	(0.056)	0.086***	(0.031)	0.071***	(0.020)	0.045**	(0.018)	0.028**	(0.013)
Environmental NGOs	0.116***	(0.035)	0.098***	(0.026)	0.047***	(0.014)	0.031***	(0.011)	0.016	(0.013)
Environmental Setting										
Storm/Hurricane/Hydrological hazard risk	-0.002	(0.016)	-0.010	(0.010)	-0.002	(0.006)	0.003	(0.005)	-0.005	(0.006)
Winter storm risk	-0.005	(0.027)	-0.006	(0.024)	0.011	(0.017)	0.018*	(0.010)	0.030***	(0.008)
Geological hazard risk	-0.044**	(0.021)	-0.010	(0.010)	0.012*	(0.007)	0.010*	(0.006)	0.006	(0.008)
Poor environmental quality	-0.031	(0.061)	0.002	(0.029)	0.013	(0.017)	0.000	(0.013)	0.009	(0.013)
Control Variables										
Fiscal resources	0.352	(0.324)	0.065	(0.171)	0.096	(0.109)	0.174**	(0.086)	0.142	(0.093)
Human resources	-0.017	(0.468)	0.204	(0.247)	0.256	(0.165)	0.271**	(0.128)	0.171*	(0.103)
Membership with ICLEI	0.210**	(0.100)	0.102**	(0.049)	0.128***	(0.034)	0.101***	(0.023)	0.120***	(0.028)
Administrative responsibility	0.253*	(0.148)	0.168***	(0.059)	0.094***	(0.029)	0.068**	(0.027)	0.077***	(0.021)
Household income	-0.048	(0.119)	-0.027	(0.062)	-0.044	(0.051)	-0.021	(0.038)	0.013	(0.030)
White American race	-0.336	(0.216)	-0.302**	(0.135)	-0.191**	(0.097)	-0.194**	(0.080)	-0.212***	(0.067)
Government form	0.199**	(0.086)	0.139**	(0.060)	0.101***	(0.036)	0.081***	(0.031)	0.074***	(0.028)
Urban area	0.105	(0.111)	0.100	(0.066)	0.088**	(0.038)	0.082***	(0.032)	0.077***	(0.028)
Rural area	-0.019	(0.135)	-0.033	(0.078)	-0.018	(0.048)	0.002	(0.039)	0.051	(0.030)
Cons	-0.711	(0.947)	1.155	(0.707)	1.836	(0.573)	1.847	(0.361)	1.881	(0.354)
State dummies	Yes		Yes		Yes		Yes		Yes	
Observations					953					
Pseudo R2	0.228		0.252		0.248		0.241		0.228	

*** p< .01; ** p <.05 * p<.10. Standard deviations are in parenthesis.

Table 4. Quantile Regressions Predicting the Breadth of Environmental Issues – Municipalities With At Least 10,000 Population

	More focused								More comprehensive	
	10%		25%		50%		75%		90%	
External Organizational Setting										
Community Interests										
Heavy polluting industries	0.004	(0.054)	0.027	(0.034)	-0.026	(0.024)	-0.027	(0.020)	-0.043**	(0.020)
New economy industries	0.255	(0.075)	0.159***	(0.041)	0.082***	(0.030)	0.055***	(0.021)	0.038*	(0.022)
Environmental NGOs	0.066***	(0.044)	0.047**	(0.021)	0.031**	(0.015)	0.030***	(0.010)	0.008	(0.011)
Environmental Setting										
Storm/Hurricane/Hydrological hazard risk	-0.011	(0.015)	-0.009	(0.008)	0.000	(0.006)	-0.003	(0.005)	0.000	(0.006)
Winter storm risk	-0.022	(0.023)	0.003	(0.014)	0.026**	(0.012)	0.023	(0.023)	0.030***	(0.010)
Geological hazard risk	-0.034**	(0.015)	-0.011	(0.010)	0.000	(0.006)	0.001	(0.004)	0.002	(0.015)
Poor environmental quality	-0.026	(0.041)	-0.020	(0.029)	-0.002	(0.015)	0.015	(0.010)	0.007	(0.015)
Control Variables										
Fiscal resources	0.318	(0.265)	0.061	(0.157)	0.020	(0.132)	0.060	(0.087)	0.194**	(0.097)
Human resources	-0.322	(0.304)	0.019	(0.346)	0.158	(0.170)	0.201**	(0.095)	0.113	(0.105)
Membership with ICLEI	0.139*	(0.081)	0.097*	(0.055)	0.097***	(0.036)	0.073***	(0.023)	0.090***	(0.031)
Administrative responsibility	0.285**	(0.112)	0.131**	(0.060)	0.087***	(0.027)	0.061***	(0.023)	0.088***	(0.019)
Household income	-0.059	(0.112)	-0.149*	(0.085)	-0.093	(0.063)	-0.043	(0.045)	-0.011	(0.031)
White American race	-0.224	(0.289)	-0.042	(0.138)	-0.095	(0.092)	-0.171***	(0.063)	-0.195**	(0.078)
Government form	0.006	(0.098)	0.063	(0.048)	0.071	(0.043)	0.081***	(0.027)	0.018	(0.030)
Urban area	0.132	(0.101)	0.136**	(0.062)	0.054	(0.041)	0.062*	(0.033)	0.059*	(0.033)
Rural area	-0.110	(0.131)	-0.054	(0.097)	-0.046	(0.070)	0.050	(0.035)	0.048	(0.032)
Cons	-0.476	(1.252)	2.675	(0.860)	2.636	(0.658)	2.201	(0.462)	2.179	(0.360)
State dummies	Yes		Yes		Yes		Yes		Yes	
Observations					646					
Pseudo R2	0.186		0.203		0.205		0.203		0.166	

*** p< .01; ** p <.05 * p<.10. Standard deviations are in parenthesis

6. Discussion

While a significant number of local governments worldwide have developed sustainability strategies, they are designed differently (Ji and Darnall 2018). Local governments that pursue a more focused sustainability strategy tend to concentrate their sustainability practices across a narrower array of environmental issues, whereas local governments that pursue a more comprehensive sustainability strategy tend to address a broader array of environmental issues in their sustainability practices. Our findings provide important implications about how external conditions are related to the design of local governments' sustainability strategies. Two factors appear salient: community constituents and disaster risk.

Related to community constituents, our findings suggest that new economy industry and environmental NGO constituents are associated with an increase in the breadth of environmental issues in local governments' sustainability practices. These constituents may encourage local governments to address environmental issues more extensively, even for those local governments that pursue a more focused sustainability strategy (e.g. those local governments at the 10^{th} or 25^{th} quantiles). While new economy industry's positive influence is not significant for local governments at the 10^{th} quantile, environmental NGO's influence remains significant. Environmental NGOs have long played as an important interest group in urban politics (Daley et al 2013) and advocated environmental protection for long-term community sustainability (Florida 2005). They have also shared their resources and competencies by building cross-sector partnership with local governments (Lane and Morrison 2006). Our results imply that environmental NGOs may provide political buffers that can fend off political resistances toward expanding local sustainability efforts, especially for local governments that pursue a highly focused sustainability strategy.

By contrast, while environmental NGO constituents' positive influences are not significant for local governments at the 90^{th} quantile, new economy industry constituents are. That is, influences of new economy industries may be more salient than environmental NGOs to local governments that pursue a highly comprehensive sustainability strategy. Similarly, influences of the heavy polluting industry constituents are also salient to those local governments at the extremely high conditional distribution, but in a negative manner. One rationale is that the new economy industry sees opportunities for their business operations when local governments pursue more comprehensive sustainability strategies (Florida 2005; Krueger and Gibbs 2007) whereas heavy polluting industries may perceive these strategies as potential threats that restrain their business operations. Our findings suggest that these industries' conflicting interests in local sustainability may play a dominant role in urban politics, especially when local governments pursue a highly comprehensive sustainability strategy.

Related to the environmental setting, disaster risk has varying influences on the breath of environmental issues in local governments' sustainability practices. More specifically, greater winter storm risk is associated with a local government's more comprehensive sustainability strategy (i.e., those at 75^{th} and 90^{th} quantiles). Similarly, greater geological hazard risk is associated with local governments' somewhat comprehensive sustainability strategy (i.e., those at 50^{th} and 75^{th} quantiles). However, greater geological hazard risk is also associated with local governments pursuing a highly focused sustainability strategy (i.e., those at 10^{th} quantile).

These results suggest that local governments' pursuits of focused or comprehensive sustainability strategies rely on their different risk taking approaches. Local governments may pursue a focused sustainability strategy due to their low-risk nature (Ji and Darnall 2018). In responding to growing geological disaster risk in their communities, these local governments may seek greater certainty from

their sustainability efforts by further constraining their sustainability practices into a narrower array of environmental issue areas. By doing so, these local governments choose the areas of focus where they are better able to address the immediate challenges associated with geological disaster risk, such as sustainable land use. By contrast, local governments may also pursue a comprehensive sustainability strategy even though they recognize its high-risk and uncertainty about performance outcomes in short term (Ji and Darnall 2018). Local governments with a comprehensive sustainability strategy appear to consider disaster risk as an opportunity to enhance community resilience to natural hazards by making a broader environmental and social change in their communities (Cutter 2014). Therefore, in responding to growing disaster risk in their communities, these local governments may pursue more of comprehensive strategies by expanding their sustainability practices across a broader array of environmental issue areas.

Finally, we do not find any empirical evidence that poor environmental quality is related to local governments' sustainability strategies. While it may be intuitive that local jurisdictions with more manufacturing industries are likely to have poorer air quality and greater NAAQS standard violations, a greater presence of manufacturing industry is not always linked to poorer air quality in a given municipality (Kahn, 1999; Robins and Kumar 1999). Industry constituents have become more aware of the importance of environmental protection and quality of life (Florida 2005). As a consequence, U.S. municipalities have experienced reductions in air pollution, with greater reductions in local jurisdictions that have been known for traditionally manufacturing industries (e.g. Rust Belt cities) (Kahn 1999). The correlations between heavy polluting industry constituents and poor environmental quality variables (0.01, as shown in Table 2) also suggest a weak link in our sample municipalities[4].

7. Conclusion

This research offers important perspective on local governments' sustainability strategies. We characterize local governments' focused versus comprehensive sustainability strategies according to how broadly they design their sustainability practices across a set of environmental issues. We suggest that local governments assess their external conditions related to community constituents and the environmental setting when determining which type of sustainability strategy makes most sense for them. Doing so takes a significant step beyond assessing local sustainability practices as monolithic activities and provides more nuanced assessments of variations in local governments' sustainability efforts (Ji and Darnall 2018; Zeemering 2009). Moreover, assessing local governments' overall sustainability strategies may provide a foundation for understanding why some local governments' sustainability practices are more successful than others.

Our findings have important implications for future research in that this study characterizes sustainability strategies based on a design feature—the breadth of environmental issues. With the growing importance of the role of local governments in adapting to and mitigating climate change (Ji and Darnall 2018), scholars and practitioners have increasingly recognized the importance of understanding how to design local sustainability practices for better performance outcomes. Distinguishing sustainability strategies according to their design offers a useful initial step towards exploring how differently designed sustainability practices relate to actual environmental performance outcomes.

[4] The link between manufacturing industries and poor environmental quality may be better observed at more local levels, such as community block and neighborhood, in that heavy polluting manufacturing facilities that often violate environmental regulations (i.e., NAAQS) tend to agglomerate in certain neighborhoods where socio-economically disadvantaged residents (e.g. African American community) are concentrated (Robins and Kumar 1999).

Other design features that future research might consider include the diversity, innovativeness and coerciveness of different policy instruments. Characterizing sustainability strategies based on these additional design features may offer further nuance about variations in local governments' sustainability practices. Our hope is that our sustainability strategy framework serves as a basis for undertaking future research in this area as there is still much to learn about the design of local governments' sustainability practices.

Finally, our research provides a possible future window to delve into the impacts of disaster risk on local governments' sustainability strategies. A longitudinal analysis is needed to assess local governments that move forward with different sustainability strategies or pivot to design a sustainability strategy in the wake of natural disasters. Such an assessment would contribute significantly to both local sustainability and hazard management literatures.

Despite the contributions, our research had some limitations. Because of data limitations, we relied on proxies for community constituent influences from environmental NGOs (e.g. the number of nonprofit organizations) and industries (e.g. the number of employees in each industry). Other measures would have offered additional nuance in studying our relationships of interest. For example, related to the influence of industry community constituents, we might consider assessing them by including the amount of revenues that each community constituent generates within a locality. Alternatively, we might evaluate their number of establishments or employment size. More finely-tuned measures of NGOs are also needed to investigate the various influences of NGOs. For example, different types of NGOs may affect local governments' design of sustainability strategies based on variations in their organizational mission and membership. Some NGOs may have a more collaborative relationship with local businesses, whereas others may have a more combative relationship, which leads to different influences on the design of local governments' sustainability strategies. Assessing the revenue sources of NGOs would offer further details about how local governments determine which type of sustainability strategy makes most sense for them.

Data limitations also prevent us from exploring the possible link between local governments' participation in regional governance networks and the design of their sustainability strategies. Scholars have long advocated that local sustainability practices must be coordinated at a regional scale by including multiple local jurisdictions (Feiock and Coutts 2013). Indeed, many leading US cities have established a cross-jurisdictional network with other cities and community organizations for developing and implementing sustainability practices (Zeemering 2012). Local governments also face coercive influences from regional authorities (e.g. metropolitan planning organizations) to solve regional environmental problems collectively (Feiock 2013). That is, the regional governance networks may encourage, or compel, local governments to develop certain sustainability strategies over another. Future research may benefit by examining how local governments shape their sustainability strategies in response to the presence of regional governance networks more directly and to what extent these networks help improve cross-jurisdictional sustainability efforts.

Finally, while we characterize local governments' sustainability strategies, we do not examine how each sustainability strategy relates to actual environmental performance outcomes. For instance, comprehensive strategies may not necessarily lead to greater environmental performance outcomes than focused strategies due to their greater uncertainty and higher risk. Prospective research should examine these issues. Doing so would take a much-needed step toward understanding the environmental and social value gained by local government by designing different types of sustainability strategies.

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