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All are not created equal: assessing local governments' strategic approaches towards sustainability

Hyunjung Ji[a] and Nicole Darnall[b]

[a]Department of Political Science, University of Alabama, Tuscaloosa, AL, USA; [b]School of Public Affairs, School of Sustainability, Arizona State University, Phoenix, AZ, USA

ABSTRACT
While local governments often implement equivalent numbers of sustainability programmes, they likely utilize different strategies to design them. We posit that some local governments pursue more of an exploration strategy, by experimenting with a broad range of sustainability issues and policy instruments to address them, while others pursue a more exploitation strategy, by focusing on a limited range of sustainability issues and policy instruments. We assess these distinctions across 70 local governments and offer evidence that governments indeed vary in their sustainability strategies. Such variations have important implications for local governments' ability to improve their sustainability conditions over time.

Since the 1992 Rio Earth Summit, many local governments have developed a suite of sustainability programmes designed to induce individuals and organizations to collectively improve their communities' environmental (Ayre and Callway 2005) and social conditions. These programmes target 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 programmes (Posner and Weisbach 2010; Wiener 2007).

Reservations exist because some local governments appear to strategically design their sustainability programmes in a way that does not substantively improve sustainability outcomes (Kosloff, Trexler, and Nelson 2004; Posner and Weisbach 2010; Wiener 2007). For example, anecdotal evidence indicates that some local governments' sustainability strategies involve the design of programmes that require only modest changes in environmental behaviour (Kosloff, Trexler, and Nelson 2004). These sustainability strategies tend to require changes to a local government's internal operations only and focus on immediate (but modest) cost savings, rather than extending their focus to the broader community (Bae and Feiock 2013; Daley, Sharp, and Bae 2013) and improving social conditions (Posner and Weisbach 2010). These more constrained strategies appear

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more exploitive in nature (March 1991) and tend to emphasize programmes with predictable (but limited) sustainability outcomes and a minimal focus on improving community well-being. However, other local governments appear to be developing sustainability strategies that involve more innovative and experimental programmes that focus on a broader array of sustainability issues and policy instruments to address them. The outcome of this strategic approach is more explorative (March 1991) and likely to yield long-term benefits (Yanarella and Levine 2008) such as improvements to human health, well-being, and resource efficiency (Fiorino 2010). These benefits are less immediate and certain (Li, Vanhaverbeke, and Schoenmakers 2008; March 1991; Moynihan 2008) and are shared among residents and government rather than concentrated within local government alone (Bae and Feiock 2013; Daley, Sharp, and Bae 2013; Moynihan 2008; Yanarella and Levine 2008).

Prior research assessing local governments' sustainability strategies has not considered whether local governments pursue exploitive or explorative sustainability strategies. Rather, existing scholarship has assumed that local governments with more sustainability programmes are likely to improve sustainability conditions to a greater extent than those with fewer programmes (Berry and Portney 2013; Owen and Videras 2008; Portney 2003; Swann 2016). What is missing from this discussion is an answer to the question of whether or not local governments with the same number of sustainability programmes utilize different strategic approaches towards programme design (Dupuis and Biesbroek 2013).

This research assesses whether local governments that implement a similar number of sustainability programmes pursue different sustainability strategies towards their programme design. We focus on two critical design features: (1) the breadth of sustainability issues and (2) the breadth of policy instrument types. We draw on March's (1991) framework, which is discussed widely in the management sciences, but as yet has not been used to assess variations in local governments' sustainability design strategies. We consider whether some governments pursue more of an exploitive strategy by addressing a more limited range of sustainability issues and narrower breadth of policy instruments to address them, while others pursue more of an exploration strategy, by experimenting with a broader range of sustainability issues and a wider breadth of policy instruments. We consider these variations by examining the sustainability design strategies of 70 United States (U.S.) local governments.

Our findings offer evidence that indeed local governments utilize different strategic approaches towards designing their sustainability programmes, even though they might adopt the same number of programmes. Some local governments appear to follow an exploitive strategy by focusing narrowly on the sustainability issues that ensure more certain economic benefits (e.g. recycling and internal government energy saving) and use more policy instruments that rely on direct government intervention for more immediate policy effects (e.g. provision of services and infrastructure upgrades). By contrast, other local governments appear to pursue a more explorative strategy that addresses a broader set of sustainability issues and use a broader range of the policy instruments. These differences in local governments' strategic approach may reflect their varying commitment to improving the natural environment (Koski 2007) and community well-being, with more restrictive exploitation sustainability strategies aiming for fewer environmental and community benefits than exploration sustainability strategies, which have a broader focus. Additionally, while an exploitation strategy may address a local government's short-term needs,

such as immediate cost savings, an exploration strategy may yield broader long-term benefits (March 1991) in the way of improved human health and well-being, social vitality, and resource efficiency (Fiorino 2010).

This research responds to appeals from scholars and practitioners alike who have expressed criticism of research that merely sums governments' sustainability efforts rather than taking a nuanced assessment approach (Berry and Portney 2013; Feiock and Coutts 2013; Daley, Sharp, and Bae 2013; Krause 2011). By evaluating their broader sustainability strategies, we offer an understanding of how local governments with the same number of sustainability programmes can have significant variations in programme design. This issue is important because organization strategy characterizes the broad way in which public organizations seek to maintain or improve their performance outcomes (Boyne and Walker 2004; Enticott and Walker 2005). Variations in governments' sustainability strategies therefore have important implications for local governments' ability to improve their sustainability conditions (Enticott and Walker 2005). Our research thus creates an important initial step towards understanding how governments' sustainability strategies might be linked with the effective programme design outcomes. Our findings also illustrate the usefulness of applying March's (1991) strategic framework to public sector strategy, and especially local governments' sustainability strategies.

Local governments' sustainability strategies

An organization's social license to operate depends on the community in which it is imbedded (Al-Saleh and Mahroum 2015; Suchman 1995). Addressing pressures that arise from stakeholders within the community enhances its long-term viability (Meyer and Rowan 1977), and requires organizational learning (March 1991). Pressures from stakeholders about sustainability concerns often cause organizations to develop new strategies to address them (Engel 2006; Porter and Kramer 2006, 2007). March's (1991) research in the management sciences posits that organizations tend to pursue one of the two strategic approaches: they either exploit existing, well-known possibilities or explore new ones. This trade-off, we suggest, can be applied to local governments' decisions to pursue different types of sustainability strategies.

Exploitation strategies are developed in an effort to reduce uncertainty associated with benefits derived from developing a collection of activities that address a similar concern (March 1991). These strategies ensure positive, proximate, and predictable benefits (March 1991). They are developed by refining and extending the organization's existing competences and practices, and focusing on a limited range of issues (March 1991; Li, Vanhaverbeke, and Schoenmakers 2008) that are practically feasible to address (Yanarella and Levine 2008; Posner and Weisbach 2010). Related to sustainability, an exploitation strategy is one that reduces uncertainty associated with the benefits derived from developing sustainability programmes. Rather than focusing on complex sustainability concerns that require fundamental changes and extensive innovation and experimentation (Porter and Kramer 2006), local governments that pursue an exploitation strategy tend to design programmes that address well-understood sustainability issues (Hart and Milstein 2003) with predictable, but modest outcomes (Posner and Weisbach 2010; Wiener 2007). Such programmes are likely to yield benefits that accrue in the short term (Michaels 2008) and are limited to addressing the organization's internal operating processes (Bae and Feiock 2013; Daley, Sharp, and Bae 2013) and efficiencies (Dupuis and Biesbroek 2013; Porter and Kramer 2007).

By contrast, exploration strategies are developed in an effort to enhance organizational innovation and experimentation around a collection of activities (March 1991; Li, Vanhaverbeke, and Schoenmakers 2008; Moynihan 2008). Exploration strategies emphasize new alternatives and variations that lead to significant improvements in desired outcomes (March 1991). Organizations that develop these strategies are motivated by competitive forces and the idea that innovation can secure their long-term position as a leader among their peers (Hart and Milstein 2003; March 1991; Porter and Kramer 2006). Related to sustainability, local governments that pursue these strategies attempt to develop a wide variety of programmes that make significant (rather than modest) strides towards improving their sustainability conditions (Portney 2003). Such programmes focus on long-term sustainability benefits as opposed to short-term wins (Hart and Milstein 2003; Porter and Kramer 2006, 2007). Because of their more experimental approach, local governments that pursue an exploration strategy shoulder greater uncertainty associated with the development and execution of their sustainability programmes (Porter and Kramer 2006; Sharp, Daley, and Lynch 2010; Yanarella and Levine 2008). Programme benefits are often less certain, less immediate, and more diffuse (Li, Vanhaverbeke, and Schoenmakers 2008; March 1991; Moynihan 2008). Governments that pursue an exploration sustainability strategy often seek to be recognized as sustainability leaders (Ayre and Callway 2005), using innovation as a cornerstone of their approach (Porter and Kramer 2006). In addition to improving their internal processes, local governments that pursue an exploration sustainability strategy tend to develop programmes that address the broader well-being of their community (Daley, Sharp, and Bae 2013; Porter and Kramer 2007; Fiorino 2010).

Two factors, we suggest, are particularly salient towards identifying the type of sustainability strategy that a local government pursues (Howlett 2009): (1) the breadth of sustainability issues that are addressed (Lafferty and Hovden 2003; Stead and Meijers 2009; Stewart and Wiener 1992; Underdal 1980) and (2) the breadth of policy instruments used individually or jointly to achieve their sustainability objectives (Simons, Pelled, and Smith 1999; Sovacool 2009; Stewart and Wiener 1992).

Breadth of sustainability issues

As part of its overall sustainability strategy, a local government must assess which sustainability issues it will address. A local government's breadth of sustainability issues is defined as all possible sources that affect environmental quality (Stewart and Wiener 1992) and social well-being (Fiorino 2010). Addressing environmental quality requires an understanding of the pollutants and sources of pollution within their jurisdictions (Lafferty and Hovden 2003; Stewart and Wiener 1992), and addressing community well-being requires an understanding of the community's vitality, quality of life, and resident health (Florida 2005). A local government may identify carbon emissions as an environmental pollutant within its jurisdiction that also affects social well-being and quality of life. Sources of that carbon could include energy usage within government facilities, businesses and residential homes, and automobiles.

Local governments that pursue an exploitation sustainability strategy are more likely to design sustainability programmes with a breadth of sustainability issues that are narrow. These programmes emphasize the local government's internal operations (Bae and Feiock 2013; Daley, Sharp, and Bae 2013) rather than the community more

broadly and focus on sustainability issues that yield immediate economic benefits (Moffet, Bregha, and Middelkoop 2004). By designing sustainability programmes with a narrow breadth of sustainability issues, they are necessarily less complex, more practically feasible, and less expensive to implement than programmes involve a wider breath of issues that extend to the entire community (Yanarella and Levine 2008). As a consequence, they do not lead to fundamental changes in local government's internal operation and have more certainty in their expected outcomes (Daley, Sharp, and Bae 2013; Yanarella and Levine 2008). For instance, the economic benefits and costs associated with solid waste diversion from recycling programmes or energy conservation from energy efficient lighting are well known (Daley, Sharp, and Bae 2013; Yanarella and Levine 2008). Certainty is further enhanced if a local government focuses these efforts on its own internal operations as opposed to the community as a whole. Addressing these sorts of sustainability issues offer more predictable, immediate, and tangible payoffs to local governments (Yanarella and Levine 2008).

By contrast, local governments pursue an exploration sustainability strategy design sustainability programmes with a breadth of sustainability issues that is much broader in focus. These programmes tend to take a more holistic approach by considering the various components of sustainability: environment, equity, and economic prosperity. Related to environment, local governments may develop multiple programmes related to solid waste, energy, water, air quality, the built environment, land use and natural habitat, and transportation. To address their equity issues, these local governments also consider safety and security, educational attainment, health and wellness, quality of life, and community capital. Economic prosperity issues are addressed by developing programmes to enhance personal income, employment, redevelopment and reinvestment, and knowledge competitiveness. By considering these three interrelated sustainability issues together (or even a subsection of them), local governments that pursue an exploration strategy consider the complexities among issues in ways that often challenge their existing operational structures and involve fundamental changes in both their organizational operations (Yanarella and Levine 2008; Daley, Sharp, and Bae 2013). Addressing a greater breadth of sustainability issues can also potentially lead to greater long-term environmental improvements while also enhancing community well-being and economic growth (Florida 2005). However, addressing many of these issues may involve less certain economic benefits, or benefits that accrue over a longer term or across more entities (Li, Vanhaverbeke, and Schoenmakers 2008; March 1991; Moynihan 2008) than local government alone.

Breadth of policy instruments

A local government must also determine which policy instruments (or bundle of instruments) it will use to address a particular sustainability issue. Policy instruments are the identifiable mechanisms used to influence individuals or organizations (Schneider and Ingram 1993). Accordingly, a local government's breadth of policy instruments is defined as the diverse mechanisms or approaches used to encourage individuals or organizations to address a particular sustainability issue (Sovacool 2009; Stern 2000). In practice, local governments utilize a variety of policy instruments to influence individuals' and organizations' sustainability behaviours (Daley, Sharp, and Bae 2013; Krause 2011)

Local governments that pursue an exploitation strategy tend to design their sustainability programmes around first-generation policy instruments. First-generation policy instruments (developed in the 1970s) involve direct government intervention via mandatory regulation or the direct provision of services/infrastructure (Jordan, Wurzel, and Zito 2005). These instruments often have well-proven policy effects because of their rigid compliance expectations or longer history of use (Long 1997). They tend to address concerns with more immediate outcomes and therefore offer a high level of certainty that their objectives will be achieved (Long 1997). While first-generation policy instruments improve environmental quality (Hirsch 2001; Stewart and Wiener 1992; Woods and Potoski 2010), they generally do not encourage individuals and organizations to go beyond compliance thresholds (Fiorino 2004) as they lack incentives to do so (Fiorino 2004; Hirsch 2001). Local governments that pursue exploitation strategies are drawn to first-generation policy instruments because these instruments offer greater certainty related to programme outcomes (Matland 1995). They also offer greater assurance of immediate policy benefits (Yanarella and Levine 2008), even if their contributions to environmental quality improvement are limited to compliance thresholds and generally do not motivate fundamental economic and social changes for individuals' and organizations' behaviour (Fiorino 2004; Jordan, Wurzel, and Zito 2005).

By contrast, local governments that pursue an exploration strategy take a broader approach by designing sustainability programmes that utilize a wider spectrum of policy instruments. In addition to using first-generation policy instruments, these local governments also use second- and third-generation policy instruments. Second-generation policy instruments (developed in the 1980s) are market-oriented, whereas third generation (developed in the 1990s) focus on social controls (Long 1997). Both are more flexible, experimental, and innovative than first-generation instruments (Jordan, Wurzel, and Zito 2005). Second-generation instruments include pollution fees, tradable permit systems, and market incentives (Stewart 1993). Third-generation instruments take an even broader focus targeting public attitudes (such as using social norming) and shaping economic structures that indirectly encourage individuals and organizations to behave more sustainably (Long 1997; Jacobsen, Kotchen, and Clendenning 2013; McKenzie-Mohr 2000). They include voluntary initiatives, such as green procurement, third-party certification, and education programmes that are more experimental (and less proven) governance approaches (Jordan, Wurzel, and Zito 2005). Local governments that pursue exploration strategies utilize all three generations of policy instruments to establish multiple approaches to address each sustainability issue (Lafferty and Hovden 2003; Stead and Meijers 2009; Underdal 1980), because the combination can yield greater long-term sustainability benefits (Kollmuss and Agyeman 2002) than those derived from first-generation instruments alone (Fiorino 2004). By taking a broader (and more innovative) approach, these governments can shape (or constrain) individuals' perceptions over time (Dietz and Stern 2002; McKenzie-Mohr 2000), which can encourage more permanent behaviour changes (Yanarella and Levine 2008) and significant improvements in environmental and social conditions over time (Yanarella and Levine 2008).

As yet, public administration scholarship has not considered whether local governments might pursue either an exploitation or exploration sustainability strategy. Rather, scholars have focused their attention on assessing the number of sustainability programmes that local governments develop, suggesting that the implementation of more (rather than fewer) programmes is related to greater improvements to the natural environment (Berry and Portney 2013; Owen and Videras 2008; Portney 2003; Swann 2016). However, this

approach is criticized by researchers and practitioners who suggest that important programme design variations are missed (Berry and Portney 2013; Feiock and Coutts 2013; Daley, Sharp, and Bae 2013; Krause 2011). Moreover, because strategic approaches are related to performance outcomes (Boyne and Walker 2004; Enticott and Walker 2005), assessing variations in governments' sustainability strategies may have important implications for the extent to which local governments' improve their sustainability conditions. We address these issues by focusing on the importance of programme design (Dupuis and Biesbroek 2013; Carley and Miller 2012; Koski 2007; Krause 2011). We suggest that, even for local governments that adopt the same number of sustainability programmes, variation is likely to exist in their programme design based on which sustainability strategy they pursue in that some pursue a more exploitive approach whereas others pursue a more explorative approach. If so, summing the number of sustainability programmes that a local government adopts provides only a basic understanding of a local government's sustainability approach.

Data and measurement

Data

To assess variations in local governments' sustainability strategies, we rely on the data from the 2010 International City/County Management Association (ICMA)'s Local Government Sustainability Policies and Programmes survey. The survey was developed with the input from ICMA's Centre for Sustainable Communities and other research institutes (Svara 2011). The sample was limited to local governments (county and municipal) that had at least 2,500 residents in their jurisdictions. A total of 8,569 local governments met this criterion. In the summer of 2010, the survey was sent to these local governments' sustainability managers and asked about their jurisdiction's sustainability programmes. Local governments that did not respond to the first survey received a follow-up reminder. A total of 2,176 (25.39%) local governments – 1,874 municipalities and 302 counties – responded (Svara 2011). Sustainability managers were provided with a list of 119 sustainability programmes, and for each of these 119 programmes, respondents were asked to indicate which actions their local government had taken. Respondents reported 'Yes' (1) or 'No' (0) for the presence of each sustainability programme.

Utilizing the ICMA data offer at least three significant benefits. First, they include the most comprehensive array of sustainability programmes currently in use at the local level (Svara 2011). While previous literature examined U.S. local governments' sustainability programmes by relying on other survey data (Berry and Portney 2013; Bae and Feiock 2013; Daley, Sharp, and Bae 2013; Hawkins et al. 2016), they are either limited to a certain environmental area (e.g. energy) (Bae and Feiock 2013; Daley, Sharp, and Bae 2013) or include a less comprehensive list of sustainability programmes (Berry and Portney 2013; Portney 2003) that tend to focus only on environmental issue area. Second, the data include a sizable number of local governments (2,176) across the entire United States – the largest survey of local government to our knowledge – and incorporate information on all types of local governments (i.e. counties, cities, and townships). Third, the ICMA survey includes both large and small local governments (Svara 2011), which differs from most other surveys (e.g. Bae and Feiock 2013; Wang et al. 2012) that limit their focus to only larger local

governments. The ICMA's broader approach provides much needed understanding about how the general population of local governments addresses their broader sustainability concerns. With respect to nonrespondents, we anticipate that local governments that failed to respond to the ICMA survey are likely to have fewer sustainability programmes overall and less formalized sustainability strategies. We therefore expect that our findings are most generalizable to local governments that have developed at least a modest level of sustainability initiatives.

Measuring breadth of sustainability issues

To measure the breadth of local governments' sustainability issues addressed in their sustainability programmes, the ICMA survey divided 119 sustainability programmes along eight sustainability issues: air, water, recycling, energy conservation, buildings, land use, transportation, and community well-being/social inclusion. We disaggregated these sustainability issues based on their specific sustainability issues and pollution sources. Doing so was important because local governments that design sustainability programmes by accounting for multiple pollution sources thus have greater breadth (Daley, Sharp, and Bae 2013). Based on their pollution source, energy conservation programmes were disaggregated into five types of energy-related sustainability issues: energy in government, energy in residential homes, energy in business, energy in outdoor lights/vehicles, and alternative energy generation. Similarly, based on its pollution source, transportation was disaggregated into three types of transportation-related sustainability issues: public transportation, alternative commuting (e.g. telework, compressed work week), and alternative vehicle modes (e.g. walk, bike). After disaggregation, we identified 14 sustainability issues: air, water, recycling, energy in government, energy in residential homes, energy in business, energy in outdoor lights/public vehicles, alternative energy generation, public transportation, commute trips, alternative modes of vehicles, green building/construction, sustainable land use, and community well-being/social inclusion.

We then categorized these sustainability issues according to their potential to provide certain economic benefits to local governments: low, medium, and high level of economic benefits. For instance, recycling, energy usage in government, and energy in outdoor lights/public vehicles (e.g. street lights, traffic signals, and vehicles for public use) were classified as having a high level of short-term economic benefit because they are related to reducing the cost of government operations (Daley, Sharp, and Bae 2013; Yanarella and Levine 2008). On the other hand, sustainability issues related to air, water, alternative energy, and community well-being/social inclusion could be categorized into the low level of economic benefit because they often generate spillover benefits across the community (rather than government alone), which make their economic effects more uncertain and diffuse (Sharp, Daley, and Lynch 2010; Yanarella and Levine 2008). Finally, there is a moderate level of uncertainty in the expected economic benefits associated with sustainability issues around energy in residential homes and business, transportation, and land use, in that expected benefits are somewhat less tangible and immediate than the benefits related to recycling and energy saving in government. We therefore categorized these remaining sustainability issues as having a medium level of economic benefit.

In finalizing the measure for breadth of sustainability issues, we utilized Shannon's H entropy score (Jacquemin and Berry 1979). Shannon's H entropy score is one of the most widely used measures for breadth or diversity of items because it is sensitive

to high levels of scope and therefore leads to wider variation than other types of breadth measures (e.g. Herphindal HirschmanIndex) (Halpin and Thomas 2012).

Shannon's H entropy score takes the following form:

$$E_E = \sum_{j=1}^{m} P_j * \ln(1/P_j)$$

where P_j is a proportion of sustainability programmes addressing jth sustainability issue in total adopted sustainable programmes, *the logarithm of $1/P_j$* is a weight of each proportion, and m is the number of total available sustainability issues, which is in this case 14. Local governments whose sustainability programmes address a greater breadth of sustainability issues therefore receive a higher the entropy score (E_E).

As a complementary measure, we also multiplied the number of each local governments' sustainability programmes with its entropy score. This second measure accounted for the quantity of local governments' sustainability programmes in addition to the distribution of sustainability issues that they address (Halpin and Thomas 2012).

$$Number * E_E = \sum_{i=1}^{n} Sustainability\ programs_i * \sum_{j=1}^{m} P_j * \ln\left(\frac{1}{P_j}\right)$$

Table 1 offers examples of four selected local governments to illustrate our measurement for the breadth of their sustainability issues. Each of the local governments in the first two columns, City of Cozad, NE and Village of Skaneateles, NY, implemented 10 sustainability programmes. However, the breadth of sustainability issues addressed in City of Cozad's sustainability programmes is more constrained than Village of Skaneateles, as evidenced by City of Cozad's entropy score of 0.77, compared to Village of Skaneateles' entropy score of 1.79. The differences in entropy scores reflect the fact that Village of Skaneateles' sustainability programmes are more evenly distributed across the 14 sustainability issues, whereas City of Cozad's sustainability programmes are more heavily concentrated sustainability issues (energy saving in street lights and public vehicles) with high level of economic benefits. In considering our second measure of breadth of sustainability issues, which accounts for the quantity of local governments' sustainability programmes in addition to the distribution of sustainability issues that they address, Village of Skaneateles's score is 17.89, compared to City of Cozad's score of 7.72. From their different scores, we can infer that City of Cozad's and Village of Skaneatele pursue different sustainability strategies even though they adopt the same number of programmes. City of Cozad appears to pursue more of an exploitation sustainability strategy in that their sustainability programmes are more likely to concentrate around sustainability issues with high levels of economic benefits. By contrast, Village of Skaneateles appears to pursue more of an exploration strategy in that their sustainability programmes are designed more broadly across all sustainability issues, from those with high levels of economic benefits to those with low levels of economic benefits.

City of Arlington, WA and City of Mercer Island, WA illustrate a similar pattern but for cities that implemented an equivalently large number (i.e. 38) of sustainability programmes. City of Arlington's sustainability programmes are designed less broadly across sustainability issues compared to City of Mercer Island's programmes. City of Arlington's sustainability programmes are constrained to a smaller number of sustainability issues, in particular those that are more exploitive with a high level of certainty about its economic

Table 1. Four exemplary cases of the breadth of sustainability issue – number of sustainability programmes across 14 sustainability issues.

Sustainability issues		Cozad, NE	Skaneateles, NY	Arlington, WA	Mercer Island, WA
Low level of economic benefits	**Total (n = 31)**	**2**	**4**	**9**	**12**
	Air quality	–	1	1	4
	Water saving and quality	–	1	5	4
	Alternative energy	–	1	–	0
	Community well-being/social inclusion	2	1	3	4
Medium level of economic benefits	**Total (n = 63)**	**0**	**3**	**14**	**13**
	Energy use in residents	–	1	1	2
	Energy use in business	–	–	–	–
	Public transportation improvements	–	–	1	2
	Reduced commute trips	–	–	4	4
	Alternative modes of transportation	–	1	4	–
	Green building and construction	–	–	2	2
	Density and sustainable development	–	1	2	3
High level of economic benefits	**Total (n = 25)**	**8**	**3**	**15**	**13**
	Energy use in governments	–	1	6	4
	Energy use in outdoor light/vehicles	7	1	2	3
	Recycling	1	1	7	6
# of sustainability programmes (n = 119)		10	10	38	38
Breadth of sustainability issues (EE)		0.77	1.79	2.79	3.53
Number * EE		7.72	17.89	106.36	134.05

Average score of the breadth of sustainability issues of 2176 local governments is 1.77, and its standard deviation is 0.54. U.S. local governments implement 17.94 sustainability programmes on average, and standard deviation is 12.41, which is ranged from the minimum, 0, to the maximum 76.

benefits, whereas City of Mercer Island has a broader, more explorative focus, which is reflected in its entropy scores (2.79 and 3.53, respectively). Similar differences are seen when the number of each city's sustainability programmes is multiplied by its entropy score. City of Arlington's score is 106.36, and City of Mercer Island score is 134.05.

Measuring breadth of policy instruments

To measure the breadth of local governments' policy instruments used in their sustainability programmes, we identified the available types of policy instruments used in the 119 programmes identified in the 2010 ICMA survey. As the ICMA survey did not categorize the 119 sustainability programmes according to policy instrument types, we established a typology of policy instruments drawing on prior research that has categorized policy instruments in local governments' sustainability programmes (Bengston, Fletcher, and Nelson 2004; Cubbage, Harou, and Sills 2007; Kaufmann-Hayoz et al. 2001; Dietz, Ostrom, and Stern 2003; Li and Geiser 2005). These studies have commonly focused on the mechanism through which a policy instrument influences individual or organizational behaviours (Kaufmann-Hayoz et al. 2001; Dietz and Stern 2002; Li and Geiser 2005). In undertaking this classification, we excluded eight sustainability programmes because they were not described sufficiently for us to determine the policy instrument that was used within the programme. We thus identified and categorized 111 (of 119) sustainability programmes into 12 types of policy instruments: voluntary agreement, provision of service, establishment of new infrastructure, infrastructure upgrade, tax benefits, direct financial

payment, reduced fees, other incentives, charges, limit, education, and green procurement. Although these policy instruments are not completely mutually exclusive (Kaufmann-Hayoz et al. 2001), each policy instrument can be considered distinct inasmuch as each depends on a different mechanism to influence behaviour.

We then categorized these 12 types of policy instruments into first-, second-, or third-generation policy instruments (Jordan, Wurzel, and Zito 2005; Long 1997). First-generation policy instruments included threshold limits, the direct provision of services, and infrastructure establishment/upgrade (Long 1997) since all heavily depend on government's unidirectional intervention (Jordan, Wurzel, and Zito 2005). Threshold limits mandate some form of behaviour or specific outcome of action by way of legal order (Kaufmann-Hayoz et al. 2001). Examples include land use requirements in urban planning, zoning codes to restrict certain development, and limits on impervious surfaces on private property. Provision of service refers to providing practices, procedures, or actions that enable individuals or organizations to achieve desired outcomes (Kaufmann-Hayoz et al. 2001). Local governments often transform and/or establish public services to promote sustainable behaviours (Kaufmann-Hayoz et al. 2001). Examples include e-waste collection services, commuter rail systems, energy audit services, and the provision of alternative work options to public employees (e.g. compressed workweek, telework). Infrastructure includes 'man-made, mobile, or immobile physical objects that shape the actor's scope of opportunities for action' (Kaufmann-Hayoz et al. 2001, 39). Local governments create physical conditions that enable or promote sustainable behaviours among individuals or organizations by establishing new infrastructures or upgrading existing ones (Dietz and Stern 2002). Examples include establishing bike lanes or sidewalks, installing charging station for electric vehicles, and installing new outdoor light fixtures, in addition to improving physical conditions by upgrading infrastructures (Dietz and Stern 2002) such as retrofitting streetlights or traffic signals, upgrading facilities' water or sewer systems, and widening sidewalks.

Second-generation policy instruments included economic instruments such as tax benefits, direct financial payments, reduced fees, other incentives,[1] and charges (Bengston, Fletcher, and Nelson 2004; Kaufmann-Hayoz et al. 2001; Jordan, Wurzel, and Zito 2005; Long 1997). Tax benefits are tax deductions or exemptions for certain activities or services (Cubbage, Harou, and Sills 2007). They encourage sustainability behaviours by reducing the marginal cost of engaging in them (Braun 2007). Examples include tax credits for residents or businesses who conduct energy audits or weatherization for their houses or buildings. Direct financial payment refers to the direct provision of financial subsidies to individuals and organizations (Cubbage, Harou, and Sills 2007), which behave more sustainably (Cubbage, Harou, and Sills 2007; Sussman 2007). Examples include reducing fees encourages individual behaviours by reducing the costs of behaving more sustainably through discounted prices or fees associated with the behaviours other than tax incentives (Bengston, Fletcher, and Nelson 2004; Dietz and Stern 2002), or reducing fees for environmentally friendly development. Charges are prices imposed for utilizing public services or the privilege of engaging in certain activities (Kaufmann-Hayoz et al. 2001). They focus on discouraging individual or organizational behaviours by raising the costs of polluting behaviours (Bengston, Fletcher, and Nelson 2004; Dietz and Stern 2002). Examples include water price structures to encourage conservation, charges based on the amount of

waste discarded, or charging market rates for public employee parking to discourage commuting.

Third-generation policy instruments included voluntary agreements, education, and green procurement, which are characterized as less intervening and more flexible policy approaches (Jordan, Wurzel, and Zito 2005) in that they influence institutional norms, public attitudes, and market drivers as policy mechanisms (Long 1997). Voluntary agreements are legally nonbinding commitments made by organizations to achieve certain objectives or take certain measures (Dietz and Stern 2002; Darnall and Carmin 2005; Kaufmann-Hayoz et al. 2001). Voluntary agreements provide local governments and community members with strategic orientation towards the declared sustainability goal that they should achieve through their collective efforts (Kemp 2000). Examples include agreements related to energy efficiency rates, greenhouse gas emission targets, and consumption goals or standards to achieve. Education is an information-based policy instrument that influences individuals' beliefs, knowledge, and beliefs in social norms (Dietz and Stern 2002; Kaufmann-Hayoz et al. 2001; Schultz 2002) by informing, educating, or communicating (Kaufmann-Hayoz et al. 2001, 48). Examples include education programmes dealing with energy conservation and reports published on a community's quality of life indicators. Green procurement refers to local governments incorporating sustainability criteria into their purchasing decisions (Li and Geiser 2005; Stevens 2010). By purchasing more sustainable products or services (e.g. office supplies made from recycled materials, energy-efficient appliances or equipment, and electricity generated from renewable energy sources) (Stevens 2010), local governments can increase their resource efficiency and shape markets towards the producing more sustainable products and services (Li and Geiser 2005). Specific examples include green product purchasing programmes, the purchase of fuel-efficient vehicles, and restrictions on the purchase of bottled water by governments.

Each local government's breadth of policy instruments was measured by the extent to which their sustainability programmes were broadly distributed across these 12 types of policy instruments. We utilized Shannon's H entropy score (Jacquemin and Berry 1979) to measure the breadth of policy instruments. The measure takes the following form:

$$E_P = \sum_{k=1}^{l} P_k * \ln(1/P_k)$$

where P_k is a proportion of sustainability programmes addressing kth type of policy instrument in total adopted sustainable programmes, *the logarithm of $1/P_k$ is a weight of each proportion*, and l is the number of total available policy instrument types, which is in this case 12. Local governments whose sustainability programmes address a greater breadth of policy instruments receive a higher the entropy score (E_P) and would be considered more explorative in nature, whereas a lower entropy score would be associated with local governments whose sustainability programmes were designed with a limited breadth of policy instruments.

As a second measure, we also used multiplied the number of each local governments' sustainability programmes with its entropy score. This measure accounted for the quantity of local governments' sustainability programmes in addition to the distribution of policy instruments that they use (Halpin and Thomas 2012).

Table 2. Four exemplary cases of the breadth of policy instruments – number of sustainability programmes across 12 policy instruments.

Policy Instrument Types		Cozad, NE	Colorado, TX	Redding, CA	Long Beach, CA
Third generation of policy instruments	**Total (n = 19)**	**0**	**1**	**4**	**12**
	Voluntary agreement	–	1	–	3
	Education	–	–	2	2
	Green procurement	–	–	2	7
Second generation of policy instruments	**Total (n = 49)**	**1**	**5**	**9**	**6**
	Tax benefits	–	–	–	–
	Direct payment	–	2	6	–
	Reducing fees	–	1	–	1
	Other incentive	–	1	3	4
	Charges	1	1	–	1
First generation of policy instruments	**Total (n = 43)**	**9**	**4**	**25**	**20**
	Limit	–	1	4	2
	Provision of service	8	1	11	9
	Infrastructure Upgrade	1	–	2	3
	Infrastructure Establish	–	2	8	6
Number of sustainability programmes (n = 111)		10	10	38	38
Breadth of policy instrument (EP)		0.96	1.97	1.65	2.68
Number * EP		9.57	19.74	62.82	102.01

Average score of the breadth of policy instruments of total local governments (2176) is 1.35, and its standard deviation is 0.45. US local governments implement 17.94 sustainability programmes on average, and standard deviation is 12.41, which is ranged from the minimum, 0, to the maximum 76.

$$\text{Number} * E_P = \sum_{i=1}^{n} \text{Sustainability programs}_i * \sum_{1}^{k=1} P_k * \ln\left(\frac{1}{P_k}\right)$$

Similarly, Table 2 provide examples of four selected local governments to illustrate the measures for the breadth of policy instruments. While the local governments in the first two columns, City of Cozad, NE and City of Colorado, TX, each implemented 10 sustainability programmes, the breadth of policy instruments used by City of Cozad's sustainability programmes is more restricted and exploitive than City of Colorado's, as evidenced by City of Cozad's entropy score of 0.96, compared to City of Colorado's entropy score of 1.97. The differences in entropy scores reflect the fact that City of Colorado's sustainability programmes are more evenly distributed across the 12 policy instruments, whereas City of Cozad's sustainability programmes are more heavily concentrated on first-generation policy instruments (i.e. provision of services). In considering the second measure of the breadth of policy instruments, which accounts for the quantity of local governments' sustainability programmes in addition to the distribution of policy instruments that they use, City of Colorado's score is 19.74, compared to City of Cozad's score of 9.57. From the difference in the breadth of policy instruments between City of Cozad's and City of Colorado's sustainability programmes, we can infer that these local governments pursue different sustainability strategies in selecting policy instruments to use in their sustainability programmes even though they adopt the same number of programmes. City of Cozad appears to pursue more of an exploitation sustainability strategy in that their sustainability programmes concentrate around the more traditional policy instruments, whereas City of Colorado's programmes are more broadly distributed across all three generations of policy instruments, implying its explorative sustainability strategy.

City of Redding, CA and City of Long Beach, CA illustrate a similar pattern, but for cities that implemented an equivalent large number (i.e. 38) of sustainability programmes. City of Redding's sustainability programmes are designed less broadly across policy instruments compared to City of Long Beach's programmes. City of Redding's sustainability programmes are constrained to the first-generation policy instruments, whereas City of Long Beach has a broader focus, as evidence by their entropy scores: 1.65 and 2.68, respectively. Similar differences are seen when the number of each city's sustainability programmes is multiplied by its entropy score. City of Redding's score is 62.82 and reflects a more traditional policy instrument-focused (exploitive) approach. By contrast, City of Long Beach's score is 102.01 and reflects an explorative strategy that incorporates all types of policy instruments.

Broader sample of U.S. local governments

For a more systematic approach to examining variations in the breadth of sustainability issues and policy instruments in local sustainability programmes, we assessed a broader sample of U.S. local governments from the ICMA data. Because we were interested in whether local governments that had a similar number of sustainability programmes design their programmes similarly across (1) sustainability issues and (2) policy instrument types, we limited the data to local governments that had a similar number of sustainability programmes and then categorized the selected local governments according to these two design features.

To assess whether local governments had a similar number of programmes, we first summed the number of each local government's sustainability programmes. We then restricted the sample to local governments that implemented a larger number of sustainability programmes (between the 75th and 80th percentile), because these governments tend to have greater flexibility in designing their programmes across sustainability issues and policy instruments than governments that implement a few programmes. The resulting sample consisted of 140 local governments had a similar (between 27 and 29) number of sustainability programmes.

Using an entropy score (E_E), these 140 local governments' sustainability strategies were then assessed for the breadth of the sustainability issues that their programmes addressed. Local governments were classified as a low-entropy score group if their breadth of sustainability issues was in the bottom 25th E_E percentile. These local governments designed their sustainability strategies to address a narrower array of sustainability issues than other local governments, despite having a similar number of programmes. We classified local governments as a high-entropy score group if their E_E was in the top 75th percentile. A total of 70 local governments comprised both the low- and high-entropy E_E groups.

Using another entropy score (E_P), the same 140 local governments were then assessed for the breadth of policy instruments they used in designing their sustainability programmes. Local governments that were in the bottom 25th E_P percentile were classified as a low-entropy score group since these local governments' sustainability programmes use a narrower set of policy instruments than other local governments' programmes, despite having a similar number of programmes. We classified local governments that were in the top 75th E_P percentile were classified as a high-entropy score group. A total of 70 local governments comprised the low- and high-entropy E_P groups.

We then conducted *t*-test to compare how local governments with a similar number of sustainability programmes design their sustainability strategies differently across a range of sustainability issues and policy instruments.

Results

Table 3 presents average number of sustainability programmes across 14 sustainability issues among the low- and high-entropy score (E_E) groups.

The results of the t-test indicate that a total number of sustainability programmes between the low- and high-entropy score groups are statistically similar, 27.34 and 27.53, respectively. However, variations exist in the breadth of sustainability issues that they address as evidenced by difference in their entropy score for the breadth of sustainability issues: 1.80 and 2.17, respectively ($p < 0.01$). Variations also exist in the complementary measure of the breadth of sustainability issues (49.32 and 59.62, respectively; $p < 0.01$), which accounts for the quantity of local governments' sustainability programmes in addition to the breadth of sustainability issues.

Even though these two groups of local governments implement a similar number of sustainability programmes, they appear to focus on different sustainability issues. More specifically, compared to those in the high-entropy score group, local governments in the low-entropy score group have developed a sustainability strategy that

Table 3. T-test results on average number of sustainability programmes across sustainability issues between exploitation and exploration strategy groups.

Sustainability issues		Exploitation strategy group (Low-entropy group) (obs = 35)		Exploration strategy group (High-entropy group) (obs = 35)		P-value
Low level of economic benefits	**Total (*n* = 31)**	**6.56**	**(0.49)**	**8.21**	**(0.30)**	**0.00**
	Air quality	1.19	(1.53)	1.53	(0.95)	0.28
	Water saving and quality	1.78	(1.58)	2.19	(1.06)	0.23
	Alternative energy	0.28	(0.58)	0.66	(0.83)	0.04
	Community well-being/ social inclusion	2.75	(2.29)	2.53	(1.14)	0.62
Medium level of economic benefits	**Total (*n* = 63)**	**7.00**	**(0.41)**	**8.65**	**(0.38)**	**0.00**
	Energy use in residents	0.47	(0.67)	1.09	(1.17)	0.01
	Energy use in business	0.09	(0.53)	0.22	(0.66)	0.40
	Public transportation improvements	0.47	(0.72)	1.25	(0.84)	0.00
	Reduced commute trips	0.75	(0.98)	0.63	(0.79)	0.57
	Alternative modes of transportation	3.00	(1.61)	3.16	(1.22)	0.66
	Green building and construction	0.63	(0.91)	1.19	(1.12)	0.03
	Density and sustainable development	2.16	(1.90)	2.44	(1.34)	0.49
High level of economic benefits	**Total (*n* = 25)**	**12.01**	**(0.45)**	**10.06**	**(0.25)**	**0.00**
	Energy use in governments	3.75	(1.44)	3.09	(1.06)	0.04
	Energy use in outdoor light/vehicles	2.41	(1.46)	2.53	(1.07)	0.69
	Recycling	5.69	(1.62)	4.56	(1.46)	0.00
# of sustainability programmes (*n* = 119)		27.34	(1.10)	27.53	(1.05)	0.48
Breadth of sustainability issues (EE)		**1.80**	**(0.08)**	**2.17**	**(0.06)**	**0.00**
Number * EE		**49.32**	**(2.86)**	**59.62**	**(2.92)**	**0.00**

Standard deviations in parentheses.

Table 4. T-test results on average number of sustainability programmes across policy instrument types between low- and high-entropy local governments.

Policy Instrument Types		Exploitation strategy group (Low-entropy group) (obs = 35)		Exploration strategy group (High-entropy group) (obs = 35)		P-value
Third generation of policy instruments	**Total (n = 19)**	**2.37**	**(0.28)**	**5.37**	**(0.28)**	**0.00**
	Voluntary agreement	0.31	(0.76)	1.40	(1.46)	0.00
	Education	0.40	(0.55)	1.09	(0.61)	0.00
	Green procurement	1.66	(1.45)	2.89	(1.18)	0.00
Second generation of policy instruments	**Total (n = 49)**	**3.60**	**(0.49)**	**4.71**	**(0.32)**	**0.06**
	Tax benefits	0.20	(1.02)	0.17	(0.45)	0.88
	Direct payment	1.34	(2.24)	0.80	(1.41)	0.22
	Reducing fees	0.40	(0.85)	0.71	(1.02)	0.16
	Other incentive	1.40	(1.03)	2.11	(1.18)	0.00
	Charges	0.26	(0.51)	0.91	(0.56)	0.00
First generation of policy instruments	**Total (n = 43)**	**20.54**	**(0.44)**	**16.97**	**(0.30)**	**0.00**
	Limit	2.26	(1.54)	3.06	(1.19)	0.02
	Provision of service	10.03	(2.04)	6.94	(1.55)	0.00
	Infrastructure Upgrade	6.37	(1.31)	5.37	(1.70)	0.01
	Infrastructure Establish	1.89	(1.05)	1.60	(1.06)	0.26
Number of sustainability programmes (n = 111)		27.23	(1.14)	27.51	(1.20)	0.31
Breadth of policy instrument (EP)		**1.34**	**(0.08)**	**1.74**	**(0.07)**	**0.00**
Number * EP		**36.60**	**(2.50)**	**47.82**	**(2.77)**	**0.00**

Standard deviations in parentheses.

focuses on sustainability issues that accrue greater (and certain) levels of short-term economic benefits ($p < 0.01$), such as recycling, energy use in the government, and energy use in outdoor light/public vehicles These governments therefore appear to be pursuing more of an exploitive strategy.

By contrast, local governments in the high-entropy score group tend to have more programmes that accrue less certain medium and low-levels of economic benefits ($p < 0.01$), such as air quality, water quality, alternative energy source development compared to those in an low-entropy score group. These benefits are also less certain, and these sustainability strategies are thus more explorative.

Table 4 presents the average number of sustainability programmes across the breadth of policy instrument types among low- and high-entropy groups (E_P).

The results of our t-test assessing the total number of sustainability programmes across the low- and high-entropy score groups indicate that they are statistically similar, 27.23 and 27.51, respectively, while variations exist in the breadth of policy instruments as evidenced by their different entropy scores for the breadth of policy instruments: 1.34 and 1.73, respectively; ($p < 0.01$). Variations also emerge in the complementary measure of the breadth of policy instruments, which is the number of sustainability programmes multiplied by the entropy score for breadth of policy instruments (39.60 and 47.82, respectively; $p < 0.01$).

Despite having a similar number of sustainability programmes, local governments show different patterns in designing their sustainability programmes. More specifically, local governments in the low-entropy score group have more sustainability programmes that use first-generation policy instruments ($p < 0.01$), such as limits, provision of services and infrastructure upgrade as compared to those in an

high-entropy score group. By contrast, local governments in the high-entropy score group have more sustainability programmes that use the second and third generation of policy instruments ($p < 0.01 – p < 0.10$), such as voluntary agreements, education, and green procurement.

Collectively, our findings imply that despite having a same number of sustainability programmes, local governments vary in the sustainability issues they address and their use of policy instruments, even if their sustainability programmes address equivalent numbers of sustainability issues and use similar numbers of policy instruments. Some local governments pursue an exploitive strategy by restricting their sustainability issues and narrowly relying on more first generation of policy instrument to ensure more immediate policy effects. By contrast, other local governments pursue a more explorative strategy by addressing a broader range of sustainability issues and broadly using all generations of policy instruments.

Discussion and conclusion

Local governments worldwide have increasingly engaged in envisioning, designing, and implementing sustainability programmes (Bae and Feiock 2013; Berry and Portney 2013; Daley, Sharp, and Bae 2013; Portney 2003; Sharp, Daley, and Lynch 2010). However, the ability of these programmes to improve sustainability conditions often varies according to local governments' strategic approaches towards designing these programmes (Darnall and Kim 2012).

Our study offers several important contributions to research on sustainability management in local governments. First, prior scholarship assessing local governments' sustainability strategies has assumed that local governments with more sustainability programmes are likely to improve sustainability conditions to a greater extent than those with fewer programmes (Berry and Portney 2013; Owen and Videras 2008; Portney 2003; Swann 2016). We extend this research by offering strong evidence that these programmes are not designed equivalently. Some local governments tend to pursue an exploitation strategy focus on a limited number of sustainability issues that ensure more certain short-term economic benefits (e.g. recycling and internal government energy use) and utilize more first-generation policy instruments to address them. By contrast, other local governments tend to pursue an exploration strategy by addressing a wider array of sustainability issues and relying on a broader spectrum of policy instruments to address them. With their more comprehensive focus, these governments tend to address more complex sustainability issues affecting environmental quality in addition to community well-being and social inclusion. Exploration strategies also include more experimental and innovative policy instruments to influence individuals' and organizations' behaviour changes. These design differences exist even if the number of sustainability programmes across both types of local governments is equivalent.

The second contribution of our research is that we identify important limitations associated with prior approaches that assess local governments' sustainability strategies. These approaches assume that the programmes are designed similarly (Hawkins et al. 2016; Portney 2003; Swann 2016) and simply sum the number of programmes that local governments implement (Schaffrin, Sewerin, and Seubert 2015). However, our research reveals that significant variations in local governments' sustainability strategies would go unnoticed if we continued to rely on typical summation approaches. Our findings thus

respond to growing concerns echoed by scholars and practitioners that more nuanced assessments are needed to understand variations in local governments' sustainability programmes (Berry and Portney 2013; Feiock and Coutts 2013; Sharp, Daley, and Lynch 2010). By evaluating local governments' broader sustainability strategies, we offer critical information about how local governments with the same number of sustainability programmes can have significant variations in their sustainability strategy. Since organization strategy characterizes the broad way in which governments seek to maintain or improve their performance outcomes (Boyne and Walker 2004; Enticott and Walker 2005), variations in how governments design their sustainability strategies may have important implications for local governments' ability to improve their sustainability conditions (Enticott and Walker 2005). Our research provides an important initial step towards understanding how governments' sustainability strategies might be linked with these effective programme design outcomes.

Finally, this research also offers important perspective on local governments' different sustainability strategies by extending March's (1991) exploitation and exploration strategy framework to the public sector. We illustrate how this framework is relevant to local governments' sustainability strategies. Our results suggest that local governments are likely to take different strategic approaches towards designing their sustainability programmes. Some local governments tend to focus on more certain, proximate, and modest policy benefits in designing sustainability programmes, whereas others tend to seek for more innovative and significant benefits even though these benefits are less certain and immediate in short term.

Future research would benefit from a more in depth analysis of the factors that influence local governments' strategic decisions. While prior research suggests that variations are likely due to differences in stakeholder (Engel and Orbach 2008) and competitive pressures (Hart and Milstein 2003; Porter and Kramer 2007), these issues have not been investigated empirically as they relate to the local governments' sustainability strategies, and especially the design features of their sustainability programmes. Additionally, future research should consider how variations in local governments' sustainability strategies are related empirically to environmental outcomes over time. Our research indicates that local governments that pursue an exploration sustainability strategy tend to address a greater breadth of sustainability issues and utilize a broader type of policy instruments in their sustainability programmes compared to those pursuing an exploitation sustainability strategy. The variations in strategic approach suggest that local governments that pursue an exploration sustainability strategy may have different sustainability outcomes from those pursuing an exploitation sustainability strategy. However, these relationships have not yet been explored systematically. Our hope is that this research offers a justification for doing so.

One limitation of our study is that it characterizes sustainability strategies based on only two design features: the breadth of sustainability issues and the breadth of policy instruments. However, there might be other salient design features to consider, such as the stringency of environmental standards and monitoring/enforcement mechanisms. Examining these sorts of features would offer a richer explanation about variations in local governments' sustainability strategies. Prospective research may also benefit by conducting qualitative analyses that examine local governments' sustainability programmes across a few in-depth cases. Such an assessment would offer greater depth about local governments' exploitive and explorative sustainability strategies and also about the extent to which local governments' sustainability strategies extend beyond the list included in the ICMA survey, especially as they relate to the social and economic

aspects of sustainability. Our hope is that results of this research offer sufficient support for undertaking future research in this area as there is still much to learn about the design of local governments' sustainability strategies.

Note

1. Examples include density incentives, incentives for other than density for LEED-certified commercials, incentives for other than density for LEED-certified single-family residential facilities, incentives for water conservation, incentives for public employees for taking mass transit to work, carpool, walk, or bike, incentives for sustainable development, and financial support/incentives for affordable housing.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Hyunjung Ji is an Assistant Professor in the Department of Political Science at University of Alabama. Her research focuses on institutional design of nonregulatory environmental programmes in both public and private organizations and its relationship with policy outcomes.

Nicole Darnall is a Professor of Management and Public Policy in the School of Public Affairs and the School of Sustainability at Arizona State University (ASU). She is also ASU Associate Director of the Centre for Organization Research and Design. Her research examines the extent to which nonregulatory incentives encourage organizations and individuals to operate more sustainability.

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