

**BEYOND ADOPTION:
THE INFLUENCE OF LOCAL INSTITUTIONAL
ARRANGEMENTS ON SUSTAINABILITY POLICY
IMPLEMENTATION AND MANAGEMENT**

By

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**Beyond Adoption:
The Influence of Local Institutional Arrangements on
Sustainability Policy Implementation and Management**

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Abstract

As we are more than a decade into describing and understanding local sustainability as a major phenomenon, local governments now face new challenges as they begin moving from commitment (i.e. stage of adopting sustainability goals and initiatives) to action (i.e. stage of implementing those). Research on post-adoption challenges is slowly emerging yet is still far from constituting a concrete understanding of the effective implementation of sustainability programs. This dissertation helps fill these gaps. It identifies the needs and challenges facing local governments in realizing their sustainability goals and, more importantly, investigates institutional conditions that may ease these challenges. In particular, it examines the following two topics that are known to be critical, yet challenging to achieve, for the effective implementation of sustainability programs: collaboration and performance management.

The broad definition of sustainability, as embedded in its three-legged stool trope – environment, economy, and equity – means that many sustainability programs are likely to exist beyond the sole purview of a single department. In fact, according to a recent study, some cities have created an office entirely responsible for sustainability management, but in most cases, sustainability program management is diffused across several departments, such as land-use management, water quality control, and infrastructure maintenance. Thus, while the cross-cutting nature of sustainability necessitates collaboration among local departments involved in sustainability management, this can be challenging given the functionally departmentalized structures commonly found in our local governments. Therefore, two chapters of this dissertation examine how various institutional arrangements and conditions shape inter-departmental collaboration in sustainability management with one at the implementation stage (Chapter 1) and the other at the evaluation stage (Chapter 3).

Performance management is another topic that is under-researched in sustainability literature despite its potential to advance local sustainability efforts. The data-driven approach

to sustainability management is rising, as found through multiple publications of best practices and case studies, yet research evidence as to what conditions effective sustainability performance management occurs under is largely lacking, especially employing large-n data. Chapter 2 thus investigates how local governments are using performance information for sustainability management and what institutional conditions may promote such evidence-based practice using information from their performance management systems.

Through the examination of the three research questions, this dissertation provides an empirical understanding of local governments' sustainability efforts at post-adoption stages and, more importantly, identifies various institutional factors that may impede or advance efforts. In order to better assess the connection between institutional conditions and managerial practices, this dissertation employs two prominent institutional theories: rational-choice institutionalism that focuses on the role of formal institutions, such as structure, mechanisms, and resources, for understanding organizational behavior, and sociological institutionalism that broadly considers and emphasizes informal institutions, such as culture, personal networks, and symbol systems that convey meanings and social cues (Hall and Taylor 1996; Lounsbury and Ventresca 2003). Overall, this dissertation provides supporting evidence for the latter in fostering a collaborative, data-driven approach to sustainability management (CH1 and CH2). Yet, it also finds that these cultural and social cues must be directly tied to the specific action or change an organization desires to make (CH2 and CH3). This point is further confirmed in the cases of formal institutions. While formal institutions tend to have relationships that are either indirect (CH1) or of small magnitude (CH2 and CH3) with the outcome of interest in each chapter, the magnitudes of the relationships are fairly substantial when designed to target a specific action (CH3).

Overall, on a theoretical level, this dissertation contributes to the rich collection of institutional studies by employing prominent theoretical perspectives and providing empirical

evidence from an under-researched topic area: sustainability. This dissertation reveals a complex picture of an institutional environment where local governments translate ambiguous sustainability goals into concrete plans and actions. The implications of the study findings are discussed for both practice and future research. On a practical level, this dissertation utilizes several original large-N datasets and explores the needs for and drivers of collaborative and data-driven management of sustainability programs beyond the anecdotal evidence found in case studies and best practices. While qualitative evidence offers an invaluable source of understanding of local sustainability efforts, its limitation in generalizing findings requires co-efforts from quantitative research to establish a robust and systematic body of research evidence for effective sustainability management. This dissertation, therefore, suggests some potential ways in which our local governments can design their institutional contexts in such a way that they help them realize sustainability goals they arduously put in place.

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Introduction

Study Context: The Rise of Local Sustainability

In 2013, Indianapolis, Indiana, completed an 8-mile bike and pedestrian path in its downtown that links its six cultural districts, neighborhoods, and 40 miles of greenway trails. The project, named Indianapolis Cultural Trail, connects various points of recreation and entertainment that residents and visitors can easily access, thereby promoting downtown vitalization. The trail also includes 25,400 square feet of stormwater plants to help ease stormwater problems, as well as 29 bikeshare stations that offer subsidized passes for low-income residents. Clearly, the trail was designed with a commitment to environmental, economic, and social well-being and has been thus recognized with multiple awards (U.S. Environmental Protection Agency¹ 2017).

Greensburg is a small rural town in Kansas known for being one of only five U.S. cities that operates on 100% renewable energy. A decade after experiencing a massive F-6 tornado that left the town nearly destroyed in 2007, the town is now the world's leading community in LEED-certified buildings and wind power energy generation, saving more than \$200,000 in energy costs per year (EPA 2015). In Arlington County, Virginia, residents can receive hands-on training on energy efficiency and weatherization techniques to work with low-income families. This serves a dual purpose of saving citywide energy consumption and attending to the burden of low-incomers in paying utility bills (International City/County Management Association² 2014).

¹ Hereafter as EPA

² Hereafter as ICMA

These are just a few examples of sustainability innovations occurring at the local level. From big metropolitan cities to small towns throughout the U.S., major sustainability efforts are now led by local communities. And, as evident in the examples above, many of these are ambitious in that they attempt to capture the very essence of sustainability: the triple bottom line (TBL) approach. TBL represents the challenging task of balancing between competing objectives of 3Es (economy, ecology, and equity) or 3Ps (profit, planet, and people) (Tumlin 2012, 7). First discussed in the 1987 Brundtland Report by United Nations Conference on Environment and Development and later coined by Elkington (1998), the term embodies the complex and crosscutting nature of sustainability (Alibašić 2017).

With the rise of local sustainability as a major phenomenon, significant research interests were also generated across a range of disciplines including public management. Much scholarly attention in the field of public management is given to understanding why municipalities would voluntarily take on sustainability initiatives given the challenges associated with materializing and calculating benefits, as well as the potential spill-over effects that can create free-riding problems (Sharp, Daley, and Lynch 2011; Krause 2011). It appears to challenge the long-standing expectation of public choice theory that posits local governments as rational policy actors. From this perspective, local governments, if possible, would always opt for economic activities where much of the welfare is imminent and retained within their jurisdictional boundaries, while providing public goods, such as environmental protection, is unlikely to make it to their policy agenda unless required (Heichel, Pape, and Sommerer 2005; Holzinger and Knill 2004; Potoski 2002). Contrasting to these expectations, however, multiple local governments adopted sustainability commitments and some even established regulatory cooperation through inter-governmental agreements in which sub-national governments voluntarily conform to a higher level of environmental standards (Holzinger and Knill 2004; Macallister 2009). Significant research ensued to understand why

municipalities, long depicted as rational actors, would make seemingly non-rationalistic decisions to work together toward self-regulating, when there is a high degree of uncertainty about the success (i.e. future benefits from the mitigation/adaptation efforts) and cost-efficiency of the policy.

Now we have a wealth of knowledge on a range of factors that drive municipalities' interest in sustainability. Many explain it through an institutional lens, such as structure and capacity of municipal governments (Bae and Feiock 2013; Homsy and Warner 2015; Lubell, Feiock, and Handy 2009; Ramírez de la Cruz 2009; Svara and Watt 2013; Wang et al. 2012), while others focus on community characteristics, such as demographics, interest groups, and problem severity or vulnerabilities (Daley, Sharp, and Bae 2013; Krause 2011; Portney and Berry 2010; 2016; Sharp, Daley, and Lynch 2011). Some scholars extend public choice theory to polycentric regional governance and consider inter-local and -regional competition and isomorphic pressure in shaping local sustainability decisions (Krause 2011; Bae and Feiock 2013; Huang, Welch, and Corley 2014).

Gaps in Sustainability Research

These earlier works have shed an important light on understanding the antecedents of local adoption of sustainability initiatives, as well as the types of plans adopted, and programs being delivered by local governments. Despite these insights, however, we are still left with an incomplete understanding of local sustainability because many questions remain unanswered, particularly regarding post-adoption stages. These questions include: What are the major challenges facing local governments as they move from commitment to action? Are there any evidence-based managerial strategies that may ease these challenges? Is the performance of local sustainability programs being measured and used for program improvement? What may support local governments with their efforts to take data-driven approaches to sustainability

management? Studies addressing these questions are slowly emerging yet are still far from constituting a concrete understanding of effective implementation and management of sustainability programs. This dissertation helps fill these gaps. It moves from why and what questions that earlier works have arduously answered through prolific research evidence, to addressing how-to questions. To that end, it particularly pays close attention to two management practices/strategies that are reported as fundamental to achieving the triple bottom line sustainability goals: collaboration and performance management.

Gap 1: Collaborative Sustainability Management

In 2009, the U.S. Department of Housing and Urban Development (HUD), the U.S. Department of Transportation (DOT), and EPA agreed to form a Partnership for Sustainable Communities to reinforce the importance of environmental, economic, and social sustainability. The partnership is to “break down long-standing silos to increase transportation options, improve accessibility to jobs and other destinations, and lower the combined cost of housing and transportation while protecting the environment in communities nationwide.” (EPA 2011). This excerpt from the EPA effectively communicates the importance of collaboration between different government functions and agencies to achieve the triple bottom line sustainability goals.

While interagency collaboration is often highlighted as an important strategy for advancing sustainability goals, such needs for collaboration also rise in the intra-organizational contexts, such as those of local governments. Often, the effective implementation of sustainability initiatives lies beyond the purview of a single individual department. Green infrastructure management, from a recently released EPA report (2017), offers a good example. Among the most cost-effective ways that municipalities can build green infrastructure is using park lands. Incorporating park features into green infrastructure plans has a potential to produce

several benefits across environmental, economic, and social dimensions, including stormwater management, improved public health benefits, and cost savings in gray infrastructure maintenance and repairs. Given its potential of creating triple bottom line benefits, it requires the engagement of multiple departments that are responsible for different functions and services within the city. Apart from the usual key players, such as public works, parks, and planning departments, it is also desirable to include transportation departments that can help identify if underutilized open space at interchanges is available to be used for drainage. Or neighborhood services/community development departments can investigate the potential of using under-performing parks in disadvantaged neighborhoods, thereby achieving community revitalization and health improvement, as well as environmental benefits. The sustainability office, if established, would play an important role in coordinating and supporting the inter-departmental engagement. As such, intra-organizational, inter-departmental collaboration is fundamental to bringing necessary expertise and resources from individual departments for effective implementation and achievement of sustainability goals. Through collaboration, local governments can also ensure that their individual departments' activities and goals align with municipal-wide sustainability goals. Thus, ICMA (2014), after a series of case studies on local governments' sustainability management, concludes that "in local governments that are truly pursuing a holistic approach, sustainability activities are dispersed throughout a number of departments."

Despite the significance of intra-organizational collaboration for sustainability management, little is known about if and how local departments involved in the implementation of sustainability programs are making collective efforts beyond their administrative silos. Therefore, two chapters of this dissertation examine inter-departmental collaboration in sustainability management; yet each addresses the topic at different phases of the policy cycle: one at the implementation stage (Chapter 1) and the other at the evaluation

stage (Chapter 3). Chapter 1 examines collaborative behaviors of local departments in a broad sense as meeting, interacting, and working together. Close attention is given to how each municipality's collaboration in sustainability management is shaped by different types of drivers of collaboration that extant research on collaboration identifies. On the other hand, Chapter 3 focuses on one specific form of collaboration, information sharing, which, over the years, arose as one of the most critical factors that determines organizational performance. It particularly explores how local departments are sharing their information for managing the performance of sustainability programs and what may explain the variations in the degree of information sharing across municipalities.

Gap2: Evidence-based Sustainability Management

Performance management is another topic that is under-researched in sustainability literature despite its potential to advance local sustainability efforts. Performance management is defined as a practice of collecting and incorporating the collected information into decision making — whether for budgetary purposes or managerial purposes (Poister and Streib, 1999). It is among the most pervasive public sector reforms that have permeated all levels and parts of governments (Holzer and Yang 2004; Kettner, Moroney and Martin 2012). In the area of sustainability, the data-driven approach to sustainability management is rising, as found through multiple publications of best practices, case studies, and government guidelines. For example, since the mid-1990s, several local governments have engaged in periodic inventories of municipality-wide greenhouse gas (GHG) emissions (International Council for Local Environmental Initiatives³ 2018a). Many of these also conduct regular updates to better understand the trends through using such software programs as the EPA's Local Greenhouse

³ Hereafter ICLEI

Gas Inventory Tool or ICLEI's clear path or contribution analysis. On the other hand, some formed a regional partnership to estimate the impacts of sustainable practices of municipalities. For example, Minnesota's Regional Indicators Initiative measures the annual performance of its 22 cities, which represent over a quarter of its population. With an aim to increase the level of overall efficiency and sustainability, participating cities share and compare data collected using four primary indicators: energy, water, travel, and waste management. Emissions and costs associated with each of these indicators are also estimated, which comprise over 90% of each city's total greenhouse gas emissions (Urban Land Minnesota Institute 2019). Efforts to develop metrics for social sustainability are also underway. For example, Lewiston, Maine, is closely monitoring its lead-poisoning rates — one major public health issue that disproportionately affects low-income neighborhoods, while in Washtenaw County, Michigan, housing affordability is measured and assessed in conjunction with public transit accessibility to arrive at a more holistic conception of social sustainability (ICMA 2014).

With the local governments' emerging interest in measuring and managing sustainability performance, research is needed to systematically identify effective strategies that will assist local governments with their sustainability performance management efforts. Currently, evidence for local sustainability performance management mostly exists anecdotally in case studies. A systematic review of how U.S. local governments are taking on data-driven approaches to sustainability management is largely lacking. Thus, Chapter 2 investigates how local governments are using performance information for sustainability management and what may further promote such efforts in local governments.

Institutional Context for Collaborative and Evidence-based Sustainability Management

Every chapter pays close attention to various types of institutions that may enable or interfere with effective implementation and management of sustainability programs. In

organizational theories, several approaches to defining institutions exist. From the perspective of rational-choice institutionalism, organizations are purposively driven actors whose actions are largely guided by ‘instrumental’ rationality that seeks maximized benefit-cost ratios. Institutions mostly studied in this tradition are formal and structural attributes of an organization that can either hamper or assist furthering this ‘instrumental’ rationality, such as the degree of formalization and centralization or organizational capacity and resources (Hall and Taylor 1996). On the other hand, for its counterpart, sociological institutionalism, organizational rationality is not only purposively calculated, but also socially constructed by a broad range of factors, such as structures, norms, symbol systems, and social cues from peers and stakeholders. (Hall and Taylor 1996; Lounsbury and Ventresca 2003). In this school of thought, therefore, “the conceptual divide” between institutions (defined through structural terms) and culture (associated with values) no longer holds, and instead institutions also include what provides “the very terms through which meaning is assigned” for guiding organizational behavior (Hall and Taylor 1996). This dissertation examines the role of various institutions from both perspectives in shaping local policy environment that leads to to different sets of choices and actions in sustainability implementation and management.

Through three chapters, the primary interest of this dissertation is to understand the institutional context, as shaped by various institutions, for a desirable organizational action or change to occur – in this dissertation, collaborative and data-driven management of sustainability programs. By understanding the needs for and the drivers of effective sustainability management, this dissertation aims to offer guidelines on how our local governments can effectively put into effect the sustainability initiatives they arduously put in place. To do so, this dissertation poses the following three questions:

- 1) What types of coordinating mechanisms are in place within local governments and how do they interact with each other for facilitating inter-departmental collaboration on sustainability implementation?
- 2) How is performance information used for evidence-based implementation and decision making in local sustainability management, and what type of institutional support is required to facilitate the practice?
- 3) To what extent are local departments engaged in information-sharing efforts for managing the performance of sustainability programs, and what institutional conditions are significant for advancing such efforts?

The next section describes each of these questions in detail.

3 Research Questions: From Commitment to Action

1) Intra-organizational Collaboration in Sustainability Implementation

Given the famous triple bottom line approach, sustainability goals can be ambitious and all-encompassing, necessitating effective managerial strategies and toolkits to achieve them. Several challenges are thus expected during the process, yet one of the most prominent is getting different actors to work together. The broad nature of sustainability goals inherently necessitates collaboration between multiple entities to ensure their actions are in line with broader collective goals and also to capitalize on necessary expertise and resources that individual entities hold (Park, Krause, and Feiock 2018). Most publications on sustainability, including government reports on best practices and research case studies, highlight the importance of engaging partners such as community members, local business and business associations, nonprofits, academic organizations, and other government agencies (e.g. ICMA, EPA, USDN etc.).

While inter-agency and -sectoral collaboration is important, intra-organizational collaboration is just as critical for maximizing the triple bottom line goals of sustainability. Some cities have created an office solely responsible for sustainability management, but most sustainability program management is diffused across several departments, such as land-use management, water quality control, and infrastructure maintenance (Feiock, Krause, and Hawkins 2017). These departments address sustainability related issues from their own particular lens, but they also overlap and collectively contribute to cities' sustainability goals. As such, implementing sustainability initiatives require inter-departmental collaboration that intersects the functional lines of different departments. Although departments are nested under a single local government, they also have their own unique service responsibilities and authority, as well as different norms embedded in their operating rules, often making collective action challenging. This suggests a critical need for instituting proper administrative arrangements that deal with the problems of functional fragmentation, so that individual departments' efforts can result in effective policy solutions that together further citywide goals (Feiock, Krause and Hawkins 2017). This research examines what administrative mechanisms are present and important among U.S. local governments in garnering cross-departmental collaboration in sustainability implementation. It particularly pays close attention to formal and informal types of drivers — how each type is individually linked to collaboration and also interplays with one another in building the capacity to forge a successful collaboration. A sample of 509 cities and towns with populations over 20,000 is used to offer empirical evidence for this research.

2) The Use of Performance Information for Evidence-based Sustainability Management

Chapter 2 shifts focus from implementation to evaluation by investigating local governments' engagement in data-driven sustainability performance management. The previous examples

show municipalities' interest in collecting sustainability programs and, more importantly, using the collected information for further advancing sustainability goals. A data-driven approach to program management is desirable because it improves the local governments' capacity to identify and prioritize the areas of need, thereby enabling them to use resources more efficiently. The use of data also helps them communicate their policy efforts to their stakeholders and obtain necessary political and administrative support for implementation. This latter point is particularly important for sustainability, as sustainability initiatives are not of primary focus to local governments in many instances. The recent ICMA survey on Local Government Sustainability Practices (2015) shows that local governments still overwhelmingly prioritize economic development (90.5%) over environmental protection (47.3%) and social equity (26.1%). In such cases, using numbers to explain their sustainability actions — why they are necessary and what they can achieve — can provide local governments with an important force to legitimize their actions and secure necessary support to continue their action. For example, in Kirkwood, Missouri, data from its greenhouse gas inventory was used for pushing forward with two major clean energy projects: traffic signal modernization and renewable energy production. Mark Petty, the director of the city's electrical department, explains it was this data-driven approach that enabled them to win bipartisan support and eventually led to successful implementation of the projects (ICLEI 2018).

Given the emerging interest in sustainability performance management among local governments, research is needed to systematically identify what can assist them with their sustainability performance management journey. It is particularly important to understand if and how local governments use — not just measure — the performance information for sustainability management and what facilitates such efforts. Public management research observes that many public agencies still do not go beyond the adoption phase where they collect, or at best passively report, information for accounting purposes, but largely fail to use the

information for improving program quality and making evidence-based decision making (Melkers and Willoughby 2005; Ho 2005; Moynihan 2008). Many explain that effective performance management still remains a puzzle due to the underutilization of collected information and thus, in order for public agencies to engage in the latter, the use of performance information, institutional culture, and support must be present to incentivize such efforts (Berman and Wang 2000; Moynihan and Pandey 2010).

Informed by this research, this chapter examines how U.S. local governments are using data-driven approaches for sustainability management, offering a systematic review of local performance management practice using a relatively large sample. Evidence is mostly found in best practices and case studies, sharing the experience of those who are at the forefront of the data-driven approach to sustainability management. A few research studies are emerging outside the U.S., notably European countries and Australia. Yet to the author's knowledge, there currently exists no systematic investigation of sustainability performance management systems and practices among U.S. local governments, particularly their efforts in using the information for program management and how organizational context may shape the efforts. Specifically, it asks: How do local governments vary in their use of performance information for sustainability management? What might explain these variations, especially relating to institutional mechanisms and conditions, which local governments may refer to when designing their institutional environment?

Drawing insights from urban sustainability, performance management, and public administration literature, Chapter 2 explores the institutional landscape of sustainability performance management systems in U.S. local governments. Institutional characteristics that are related to increased use of performance information in sustainability management are identified using a novel dataset that merges city-level demographic and institutional

information with nationwide survey data that was recently conducted to understand sustainability performance management practices.

3) Inter-departmental Information Sharing in Sustainability Performance Management

The last chapter extends the collaborative implementation discussed in Chapter 1 to explore collaboration at the evaluation stage by examining one particular form of collaboration required for effective performance management of sustainability programs: information sharing. Information sharing is important because the performance of a single sustainability program often depends on the expertise and informational resources of several related departments within the municipality, as seen in the example of green infrastructure previously. To achieve sustainability goals that broadly concern social, environmental, and economic problems, sharing information about individual departments' activities and performance transcending departmental boundaries is a must. Such an importance of data sharing is also highlighted in a series of case studies on Local Government, Social Equity, and Sustainability Communities, released by ICMA (2014). In one study of Washtenaw County, Michigan, Andrea Plevak, then executive director of the county's Community and Economic Development office explains "[t]here are a lot of data out there, but they only provide a slice of the picture. ... They don't tell you how they connect. If systems don't talk to each other and data are not shareable, then they're not that helpful. It is more important to be able to integrate data at a local level and focus on what is most important."

Information sharing is vital not only at the implementation stages, but also at the evaluation stages where the information on the program performance is collected, shared, and assessed. This is particularly so in the context of performance management, as the effective use of performance management systems requires timely access to quality data, which in turn requires the consistent and reliable supply of information from each department involved in

sustainability implementation. However, research finds that information sharing is still an exception rather than a norm in most cases and points to the institutional force in shaping and advancing the practice. This is because it entails the arduous task of creating a collaborative culture where departments contribute their inputs, e.g. performance records, to the system and communicate with a greater and wider community. This can be challenging given the current dialogue that emphasizes results-driven and performance-oriented management in the public sector, as well as the performance budgeting movement that links program performance to budget allocations (Melkers & Willoughby, 2005; Poister & Streib, 1999; Lu, Mohr, and Ho 2015). Such an emphasis may cause the heightened level of sensitivity and resistance to disclosing performance information, especially when not mandated, which is the case with sustainability. Research notes that the mandated requirements for performance reporting on sustainability programs tend to be minimal and underdeveloped in the public sector, often requiring voluntary and motivational factors to sustain the practice (Chai 2009; Volkery et al. 2006).

Therefore, Chapter 3 investigates the extent to which city departments are making efforts to share and integrate their knowledge and information in managing sustainability performance and what institutional conditions may advance such efforts. A sample of 443 U.S. cities and towns, collected from a recent survey on local sustainability performance management, is used for this inquiry.

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Chapter 1 An exploration of the mechanisms building collaboration capacity in local sustainability efforts: Assessing the duality of formal and informal drivers

Introduction

Many of the challenges facing local governments are multifaceted and intertwined, and thus require integrated policy efforts that intersect functional lines of multiple departments. Sustainability is one such issue. The encompassing nature of sustainability, which spans social, economic and environmental dimensions, suggests that collaborative approaches are needed for effective implementation. However, under traditional Weberian administrative settings, in which divisions and departments are structured around specific functions and specializations, collective action can be challenging as a result of fragmented authority and the different rules and norms that guide the actions of different units (Feiock, Krause, and Hawkins 2017). This points to the importance of various coordinating mechanisms able to promote collaboration and alleviate problems rising from functional fragmentation. Shaping an institutional context that facilitates cross-departmental collaboration requires an understanding of the dynamic underlying two questions: First, what are the attributes and qualities associated with effective collaboration? Second, how these qualities can be facilitated and promoted in organizations?

Collaboration literature offers rich insight into the first question. After decades of research, collaboration and network scholars generally agree that certain characteristics of networks are particularly important for initiating and sustaining collaboration, including trust, reciprocity, and shared goals (Agranoff and McGuire 1998; Emerson, Nabatchi, and Balogh 2012; Gazley 2010; O’Leary et al. 2009). We now have a wealth of empirical evidence that partnerships and networks where the aforementioned qualities are present tend to be more successful in achieving desired collaboration outcomes and are better able to maintain that

collaboration over time. Insights into the second question about the processes of cultivating those qualities are less well developed. Clearly, trust and shared understanding are key ingredients in forging successful collaborative regime, but how are trusting and mutually understanding relationships promoted within organizations? Do administrative arrangements have important implications on fostering such relationships, and if so, how do they vary between casually arranged (e.g. informal communications and self-organized task force) or formally institutionalized mechanisms (e.g. formal agreements and mandates)? This chapter addresses these how-to questions by examining different mechanisms employed within U.S. local governments for coordinating sustainability efforts⁴. It empirically examines the individual significance that formal and informal arrangements have on intra-governmental collaboration and explores if any interplay exists between the two. To that end, this chapter uses survey data of 509 US cities with populations over 20,000, in which cities were asked to provide information on administrative mechanisms and arrangements that they use to coordinate when implementing sustainability initiatives. The survey was conducted from late 2015 to early 2016 and provides an up-to-date snapshot of interplay between the formal and informal dynamics that shape U.S. city governments' decisions to collaborate on sustainability.

This chapter builds on existing research to develop theory-informed hypotheses yet departs from many other works and contributes to current literature in two ways: First, the relevant literature has relatively few studies that rely upon large-n approaches, which allow for improved generalizability and falsifiable hypotheses. Informal mechanisms, in particular, are often discussed through case studies of specific governance issues (Ansell and Gash 2007).

⁴ Research on collaboration identifies there is a continuum of interorganizational relationship where on the far-left end stands cooperation, mostly supported by informal relationship, and on the far-right end stand formalized integration. Coordination and collaboration are between the two ends. The terms are often used interchangeably, and no distinction is made between coordination and collaboration in this chapter. Nonetheless, efforts to conceptually and empirically differentiate them are critical and under way. Please see Selden, Sowa, and Sandfort (2006) for the discussion and a continuum of collaborative service arrangements.

While this is useful for understanding the normative assumptions inherent in collaborative management, such as trust and culture and their nonlinear nature, there has been a consistent call in the literature that collaboration research is in need of more systematic quantitative research to complement the rich collection of case studies in order to arrive at “a general theory of collaboration.” (Ansell and Gash 2007; Thomson, Perry, and Miller 2007; Wood and Gray 1991). This study responds to this call. Secondly, while several studies have documented conditions under which successful inter-organizational collaboration occurs, such as between different levels of governments (Daley 2009), public-private entities (Koontz and Newig 2014), and public-nonprofit agencies (Gazley 2008), less is known about intra-organizational collaboration. Intra-governmental collaboration is particularly important for issues, like sustainability, which do not easily fit within traditional administrative functions and departments structures (Feiock, Krause, and Hawkins 2017). This chapter is among the first to empirically examine intra-governmental collaborative efforts in sustainability, using large-N data. By extending the current discussion to empirically modeling existing hypotheses and mid-range theories accumulated via case studies, it contributes to elaborating a general model of collaborative management.

The chapter proceeds as follows: First, it explains the increasing importance of collaboration among multiple units within a single government and the attainment of cohesive and sustainable collaborative ties that the existing literature has documented. Particular attention is given to an emerging consensus on the important role of informal aspects of network management. This perspective is then contrasted with a competing explanation that emphasizes the role of formal institutions in strengthening collaborative ties. Three hypotheses are developed and modeled using Structural Equation Modeling (SEM) – a sophisticated statistical methodology that allows one to hypothesize causal assumptions between multiple latent constructs and evaluates the validity or the plausibility of the hypothesized assumptions

through various fit indices and reverse causality tests. Models are graphically presented, along with the discussion of estimated results. The chapter concludes with implications for both research and practice as well as suggestions for future research.

Literature Review & Hypotheses

Collaborative Capacity

The dilemma of coordinating actions across agencies, sectors, and jurisdictions has been widely noted in public administration and related fields. Scholars across several fields are now engaged in efforts to address the dilemma and grapple with how to arrive at a collective policy response that rises above the fragmented authorities and boundaries of individual organizations and jurisdictions (Agranoff and McGuire 1998; Bardach 1998; Carr and Hawkins, 2013; Feiock 2004; Feiock and Scholz 2010; Feiock 2013; Weber and Khademian 2008; Wilson 1989). Among them, Functional Collective Action (FCA) framework particularly explores the challenges and externalities inherent in coordinating policies that span multiple departments within a single government. Although city departments are structurally nested under a single local government, they each have their own core service responsibilities and spheres of authority, as well as different norms embedded in their operating rules (Feiock, Krause and Hawkins 2017). This makes collective action challenging, because achievement of collective interests often requires actions that are not necessarily in the best interest of individual departments (Hardin 1982; Lam 2005). This suggests a need for administrative arrangements that address the problems of functional fragmentation and align the interests of individual departments with those of the collective to further city-wide goals.

Defining what constitutes successful collaboration, by identifying key characteristics or qualities that successful collaborative networks display, is foundational to this research. For successful collaboration to occur, research generally agrees that certain elements matter, such

as trust, mutual respect, open and innovative mindsets, and shared understanding of goals and tasks (Agranoff and McGuire 1998; Ansell and Gash 2007; Emerson, Nabatchi, and Balogh 2012; Gazley 2010; Getha-Taylor 2012; Thomson and Perry 2006). The importance of these qualities has been highlighted by rich and diverse scholarly discourses held under various names, such as “collaborative advantage” (Huxham 2003), “collaborative capacity” (Bardach 1998), “cohesion factors” (Agranoff and McGuire 2001), and more recently “process performance of collaboration.” (Emerson and Nabatchi 2015).

The emphasis on these qualities is explained when one understands the costs and tensions inherent in working together. Despite its potential to generate effective and innovative policy solutions, collaboration can be a costly option for several reasons. For example, heterogeneous and diverse collaborative networks often experience higher transaction costs as a result of differential goals which may require additional time and mediation to work through (Feiock, Steinacker, and Park 2009; Feiock 2013; O’Toole & Meier, 2004). Collaboration also almost inherently prolongs the policy processes, because it invites dialogues and debates from extended network members, which can add costs and further restrain already resource-constrained policy communities (Berry et al. 2004). In such circumstances, research repeatedly finds that trust and a sense of reciprocity play important roles in easing the tension by dampening the perceptions of threat and insecurity. They also contribute to reducing transaction costs by generating social constraints that ensure credible commitment (Becerra & Gupta 1999; Hindmoor 1998; Leroux et al., 2010). Therefore, understanding the contexts and conditions under which trusting and reciprocal relationships arise and develop is important to overcoming collective action dilemma and sustaining long-term collaboration (Carr and Hawkins 2013; Feiock, Steinacker, and Park 2009; Feiock 2013; O’Toole and Meier 2004). This chapter adopts Bardach’s term “collaborative capacity” to refer to these qualities

collectively and investigates institutional mechanisms that are related to promoting the qualities associated with collaborative capacity.

Significant research attention has been given to establishing the logic of collective action, yet decades of research on collaboration processes and mechanisms reveal just how challenging and complex it is (Chris Ansell and Gash 2007; Bingham and O’Leary 2006; Bryson, Crosby, and Stone 2006; Emerson, Nabatchi, and Balogh 2012; Laurence E Lynn, Heinrich, and Hill 2000). Although a clear and agreed upon understanding has not yet emerged about how particular institutional arrangements are linked with desired collaboration qualities, scholars generally examine the links from two major and often conflicting standpoints: formal and informal institutions to enhance collaborative capacity. This chapter therefore outlines major arguments from these two viewpoints and examines both the individual and interactive role of the two that may reinforce and strengthen the effects of each other on intra-governmental collaboration. The following section provides a literature review and develops several hypotheses to seek for supporting evidence for each view point.

Inside the Black Box of Collaboration– Informal Drivers

Governance is often conceptualized as a form of fluid and boundary-crossing networking, that includes both vertical as well as horizontal relationships (Agranoff and McGuire 2004; McGuire 2006). Research reveals that the chief governing protocol for embedding shared commitments and the norms of reciprocity in organizations is through “iterative and cyclical processes” of negotiations, engagements and interactions (Ring and van de Ven 1994; Emerson, Nabatchi, and Balogh 2012; Thomson and Perry 2006). Emerson, Nabatchi, and Balogh (2012) explain that continuing interactions, through what they call *principled engagement*, enable participants with different values and beliefs to cultivate “a shared sense of purpose and a shared theory of action for achieving that purpose.” Repeated

principled engagement helps produce a sense of collectiveness, while also enabling these resulting positives to feed back into the process, almost functioning as a self-reinforcing loop.

Given the importance of iterative and interactive engagement for cultivating the key ingredients of successful collaboration, many scholars observe that the traditional Weberian bureaucratic paradigm is unlikely to be an ideal facilitating structure; a hierarchical and authority-based approach that emphasizes control and centralizes decision-making tends to prevent employees of various positions from engaging in dialogues and exchanges of ideas (Bardach 1998; Lam 2005; Simon 1991). The rigidity of formal structures and institutions also discourages problem solving in a creative way, while compartmentalized labor arrangements that meant to maximize efficiency tend to breed organizational silos (Kim and Lee 2006; Tsai 2002; Willem and Buelens 2007). Many have thus expressed reservations about the efficacy of traditional top-down approach of bureaucracies in collaborative management, and some even expressed that the establishment of a clear principal-agent relationship is “a near impossible, maybe even meaningless, exercise” in such a diffused, networked structure of policy implementation (Agranoff and McGuire 2004, 188).

Instead, a growing number of scholars focuses on relational aspects of collaborative dynamics, such as personal links, informal communications and interactions. This is evident in the heightened research on social networks, which has shifted analytical anchor for understanding society from what was previously based on individuals to networks consisting of relations (Wellman, Carrington, and Hall 1988; Williams and Durrance 2008). Relations play a key role in building a collaborative network; they not only links information and resources dispersed in a network but also breed social capital, which are characterized by “the norms of reciprocity and trustworthiness” – the key ingredients of collaboration (Putnam 2000, p.19). Supporting empirical evidence for such positive expectations of social network has been much explored in the literature (Getha-Taylor 2012; LeRoux, Brandenburger, and Pandey 2010;

Koontz and Newig 2014; Parker and Brey 2015; Yang and Maxwell 2011). Research reports cases where strong ties (relations) build a solid foundation of social capital, which in turn obviates investments in making and maintaining formal mechanisms to enforce collaborative behaviors by working as “self-enforcing safeguards.” (Dyer and Singh 1998)

Given the importance of relational governance, the concept of psychological contracts – a set of beliefs about reciprocal obligations as contrasted to legally binding contracts (Levinson et al. 1962; Morrison and Robinson 1997) – and informal arrangements have also emerged as promising mechanisms for building collaborative capacity (Thomson and Perry 2006; Ring and van de Ven 1994). Voluntary and informal meetings are likely to arise from some level of motivation to work together or personal connections already established, thus individuals may experience less turbulence in negotiations and engage in meaningfully collaborative dialogues. On the other hand, mandated meetings or formal agreements may bring people to the negotiating table but are likely to be limited in achieving the same level of motivation and effects. Research finds that the increased flexibility and open communication opportunities that informal rules and systems bring facilitate inter-group exchanges of information and knowledge (Kim and Lee 2006; Tsai 2002; Willem and Buelens 2007). Therefore, it is hypothesized that:

H1: Informal drivers are *directly* and positively associated with collaborative capacity.

Inside the Black Box of Collaboration– Formal Mechanisms

Other researchers caution us against the premature abandonment of traditional bureaucratic paradigm for shaping collaboration (Lynn, Heinrich, and Hill 2000; Provan and Milward 1995). Several studies report that despite the widely-held supposition about the incompatibility of hierarchy and collaborative management, the blending of the two is common

in every day practices (McGuire 2006). For example, in their extensive review of research on collaboration in information sharing both within and across agencies, Yang and Maxwell (2011) conclude that there is nontrivial evidence that formalized structures are not the main obstacle to collaborative information sharing. The claims that horizontal governance is the emerging mode of public policy implementation are also not conclusive. Despite the commonly-held view of governance as increasingly networked and associational among equals, evidence also suggests the continuing presence of traditional and centralized arrangements of public service delivery (Hill and Lynn 2005; McGuire 2006). Provan and Milward (1995), in their groundbreaking study on the network of mental health service providers, conclude that non-fragmented influence that is centralized through a “core agency” plays a determining influence on effective network performance. Even when actions are coordinated through informal negotiations, research finds that they often occur under the shadow of hierarchical authority (Lam 2005; Scharpf 2018; Tang 2018).

There are several reasons why collaboration rules and behaviors may be mandated and formalized. First, as noted above, governance is inherently political. The previous section emphasized the iterative process of negotiations – and renegotiations – as a chief governing mechanism for collaboration. The flip side of these iterative processes is also repeated bargaining over challenges like resource struggles and diffused accountability, which can result in “winners and losers” (Lynn, Heinrich, and Hill 2000). Especially, if we apply the dominant framework of institutional behavior to understanding the logic of collective action and assume that participants in collaborative networks are rational and self-interested actors, challenges and risks facing collaborative management should not be strikingly different from those of the traditional principle-agent paradigms. Information asymmetry and hidden actions can seriously hamper optimizing collective efforts while the interdependent nature of working together runs a risk of generating perverse externality (e.g. free-riding) (Williamson 1985; Lam 2015). This

is particularly so, in the area of sustainability. The nature of sustainability that widely spans spatial and temporal scales makes it susceptible to such perverse externality issues, often preventing it from being a chief priority for many city government units (Feiock, Krause, and Hawkins 2017). Often, city departments are requested to carry out sustainability programs on the top of their original tasks and responsibilities, which requires conscientious and self-motivated efforts to co-work.

Research therefore indicates that while authority-based and formally institutionalized mechanisms may not necessarily facilitate trust in the same way informal relations do, they can reduce confusion and collaboration costs by specifying roles and procedures (Leischnig et al. 2014; Parker and Brey 2015). It can also ensure that those who make deliberate efforts to collaborate would be reciprocated by others' good efforts, and if not, those opportunistic behaviors would be identified and sanctioned to reinforce the norm of reciprocity (Lam, 2005). Institutionalized rules and authority can ensure that the self-interests of individuals do not supersede the collective interest. In short, interpersonal relationships must present to cultivate cohesive and collaborative partnerships, but in order for collaborative cultures to evolve and sustain over a long-time through the continuing practice of informal voluntary participation, it needs to be reinforced by formal structures (Emerson, Nabatchi, and Balogh 2012; Milward and Provan 2000). Based on these discussions, it is hypothesized that:

H2: Formal drivers are *directly* and positively associated with collaborative capacity.

H2a: Formal drivers, while not having a direct relationship with collaborative capacity, *indirectly* influences collaborative capacity through the mediating role of informal relations.

Figure 1-1 presents the graphical representation of constructs and their relationships (paths) as hypothesized; the graph (a) models direct association that each type of drivers has

with collaborative capacity. No path is specified between the drivers other than covariance between the two (colored in red), indicating a simple correlational relationship. On the other hand, the graph (b) draws a casual arrow between informal and formal drivers. This hypothesizes that formal institutions, while lacking a direct path, are indirectly and positively linked to collaborative capacity through their interplay with informal dynamics. The next section describes data and models to estimate how these hypotheses are empirically borne out.

[Figure 1-1 here]

Data and Model

Data

The three hypotheses are tested using data from The Smart and Sustainable Cities Survey, which was administered from late 2015 through early 2016 via both electronic and follow-up postal mail questionnaires. The main objective of survey was to collect data on the administrative landscape of U.S. city governments in implementing sustainability policies and programs. Given that most sustainability issues require jointed action from multiple units, a key interest was to understand varying institutional arrangements that cities have employed for coordinating their actions and how such variation affects policy efforts and outcomes. The survey was sent to the staff member in all US cities with populations over 20,000 (n=1282) who was pre-identified as being most responsible for its sustainability efforts, first thorough website searches using such terms as “sustainability,” “sustainable development,” “green,” and “climate protection.” In cases the primary contact information could not be obtained electronically, the department was called directly to identify the focal point of contact. The response rate was 39.8 percent with a total of 509 responses. Variation exists as to the distribution of units and departments where the contact person was affiliated with, but they

mostly cluster around a few offices with planning (36.5%) being the most represented, followed by community development (20.3%), public works (13%), sustainability/environmental services, and city manager office (9.1%).

Model

This study models a multivariate regression with latent constructs as key independent and dependent variables through Structural Equation Modeling (SEM). SEM is chosen on both theoretical and methodological grounds: First, this chapter employs cross-sectional data. As with other regression methodologies with cross-sectional data, SEM does not provide evidence for causality unless longitudinal data is employed. However, one major benefit of the methodology is that it allows one to set up several alternative models and compare which of the theorized models fits the observed data most optimally and thus is the most plausible. In other words, it brings causal assumptions – informed by theory – and empirical data to assess how well the hypothesized interrelationships among the variables match those of the actual or observed data. One can determine the validity of one's theorized models through reverse causality tests and comparing fit indices across models. (Bollen and Pearl 2013). This is not to say that one can make causal claims. Due to the benefit of reverse causality analyses and the availability of fit indices for each model, some people mistakenly claiming causality even when using cross-sectional data (Norman and Streiner 2003). Rather, the chief objective of SEM is to compare different models and evaluate the plausibility and the validity of the theorized causal assumptions across models, which is exactly what this chapter aims to achieve.

SEM is also useful here, as this chapter models multiple latent constructs as key variables of interest. Both of dependent and independent variables are measured using multiple survey items to better represent each contract of formal and informal dynamics as well as collaborative capacity. SEM effectively controls for problems rising from fitting multiple latent

variables, such as interactions, non-linearity and most notably measurement error – a common problem in survey data research like the current study. At the basic level, it employs a diverse set of statistical techniques that are largely utilized in path analysis and factor analysis. Factor analysis uses multiple indicators to measure each latent construct but lacks the ability to estimate causal relationship between the latent constructs. Path analysis on the other hand identifies paths connecting variables, but only those of observed ones (i.e. using only a single indicator). SEM integrates and advances the two methodologies by complementing what is absent in each approach while taking advantage of their strengths. It hence allows researchers to uncover latent constructs using not one, but multiple indicators, and estimates paths between multiple dependent and independent variables simultaneously.

Two latent constructs – *Informal and Formal Drivers* – were created as key independent variables predicting another latent construct *Collaborative Capacity* (DV). *Collaborative Capacity* is conceptualized as a collaborative dynamic showing essential ingredients for strengthening collaborative ties, such as mutual trust, reciprocity, open and innovative mindsets, shared understanding among collaborative partners. A total of five indicators were used to form the construct of collaborative capacity. Respondents were asked to rate how well the following five statements describe collaboration on sustainability among departments in their cities: departments trust each other; share information openly; fulfill commitment; show willingness to take risks together; agree on overarching sustainability goals; and do not pose difficulty of monitoring the output of collaborative activities. Responses were recorded on a Likert-scale range from 1 = “Disagree” to 4 = “Agree.” To operationalize the dimension of *Informal Drivers*, the survey asked respondents about the frequency of informal communication and interaction as well as the use of ad-hoc, voluntary, self-organized meetings for collaborating on sustainability implementation. For *Formal Drivers*, respondents were asked to what extent to they make use of written agreements and structured meeting for soliciting collaborative

behaviors as well as their reliance on mandates and directives from the upper management to capture the shadow of authority concept. Each of formal and informal constructs were measured using four survey items measured on a five-point Likert-like scale.

To obtain *ceteris paribus* effects of key constructs, the model also includes two additional latent constructs that research finds significant for understanding the logic of collective action. First, extant research emphasizes the role of *Institutional Capacity* in convening and developing collaboration. It is measured here using three survey questions assessing whether or not the lack of institutional capacity was an obstacle to achieving greater sustainability goals in terms of budget, staff, and information resources. Responses used a five-point Likert-like scale from 1= “Not an Obstacle” to 5 = “Substantial Obstacle.” The variables were coded in reverse for consistent interpretation with other variables. Second, the previous section discussed how sustainability is often not a high priority for most city governments and thus may require extra efforts to induce collaborative behavior among departments who are already tasked with other jobs and responsibilities. Therefore, this chapter also considers the degree to which sustainability is promoted as an important city-wide policy goal. A total of three survey items that asked, on a five-point scale, the extent to which the respondent cities prioritize environmental sustainability, climate adaptation and mitigation were used to measure a latent construct of *Priority*. In addition to the two latent constructs, *Lead Agency* is included as a control. It is an observed (manifest, not latent) variable and represents how much of the responsibility for managing sustainability initiatives the respondent department has. Departments chiefly tasked with sustainability implementation are overall likely to possess better understanding of sustainability implementation. Thus, controlling for these variations of department responsibility is necessary to account for potential response biases and inaccuracy, particularly given that the model employs survey data. Table 1-1 describes survey questions used to construct variables.

[Table 1-1 here]

A note on Common Method Bias

Common method bias (CMB) arises when variations in responses are attributable to the measurement method rather than the actual qualities of the construct that the measures attempts to unveil. Some common issues with survey data, such as social desirability or halo effects where certain tendencies of survey respondents may distort survey results are especially susceptible to introduce CMB in analysis. Without appropriate statistical remedies, such systematic error variance can confound the empirical results, leading to potentially false conclusions (Podsakoff et al., 2003). Since the survey this study employs intends to capture collaborative dynamics of public agencies, which are now largely deemed as socially desirable behaviors both in research and practice, I employ Harman's single factor test – one of the most commonly used procedures to test for common method bias. Significant common method bias would result in items loading on a single general factor accounting for the majority of variance in the variables. Harman's single factors score for this study data indicates no such single factor with the total variance of 19.99% – well below the suggested threshold of 50%, should CMB be present. Thus, I conclude common method bias is not a serious concern in this study.

Results and Discussion

This study estimates the model using Lavaan package available in R. Given the ordered categorical nature of Likert scales, parameters were estimated with the weighted least squares means and variances adjusted (WLSMV). SEM consists of two steps: 1) constructing latent variable primarily through confirmatory factor analysis using multiple observed indicators and; 2) fitting the structural model by identifying paths between the constructed latent variables. One can only proceed to the second step when the measurement model has

been validated. This model employs five latent constructs and the validity of each construct was assessed in terms of convergent validity, reliability, and discriminant validity.

Convergent validity is assessed through both examining individual standardized factor loadings as well as obtaining the values of average variance extracted measures (AVE). A minimum of .5, and preferably .7 is suggested for factor loadings and a minimum of .5 for AVE, whereas for construct reliability test, .70 is recommended as a cut-off criterion (Hair et al., 2006). Table 1-2 presents standardized factor loadings (λ) that show how each of 5 latent constructs are measured by 19 observed indicators along with fit indices at the bottom. Both standardized factor loadings and AVE estimates as well as construct reliability estimates satisfy the guidelines and all t-statistics for the loadings are also statistically significant at .001 level. As to discriminant validity, table 1-3 shows the correlation matrix between the four latent constructs. All correlation coefficients are below .4, suggesting that constructs are distinct from one another. Squared inter-construct correlations (values above the diagonal) are also substantially lower than all AVE estimates reported in Table 1-2, which is another indication supporting discriminant validity. Taken together, the evidence suggests that the 19 indicators reflect the theoretical latent concepts that they attempt to measure, yielding 5 latent constructs that are internally consistent and sufficiently distinct from each other.

[Table 1-2 here]

[Table 1-3 here]

Given the evidence supporting measurement model validity, two structural models were estimated to test both direct and indirect paths of institutional drivers on building collaborative capacity. Figure 1-2 visually presents the paths and their respective significance for both models. Two-sided covariance arrows are drawn between all exogenous constructs, since none of them are strictly independent of each other. To enhance visual representation and the interpretation of result, the graph was simplified, excluding the covariance arrows,

insignificant coefficients, and the control variable, lead agency, which was found to be insignificant. A solid line represents a significant path, while the dashed line indicates an insignificant path.

The first model estimated individual paths of formal and informal drivers to collaborative capacity. No relationship was assumed between formal and informal drivers, except a simple correlation. Results showed a significant and positive path for collaborative capacity from informal dynamics (p-value <.001), while no such relationship was observed with formal dynamics. This suggests that the sample cities that often utilize informal communications and meetings, such as ad hoc face-to-face meetings and self-organized task force, tend to be associated with the higher degree of trust and shared understanding among collaboration partners, compared with cities that primarily rely on mayoral or managerial mandates or written rules for collaborating on sustainability management. In other words, a city department implementing sustainability in a multi-unit organization is able to forge more successful and trusting collaborative ties with other city departments when they are engaged in more informal, voluntary, and interpersonal interactions.

[Figure 1-2 here]

After confirming the absence of a significant direct path between formal drivers and collaborative capacity, the second follow-up model was estimated to unveil potential indirect path that may exist between formal drivers and collaborative capacity. It draws arrows from formal drivers to both informal drivers and collaborative capacity, indicating that the latter two are endogenous variables, while the rest are exogenous. Consistent with the first model, results show a significant path between informal drivers and collaborative capacity, supporting hypothesis 1. The graph also shows a significant and positive path between formal and informal drivers (p-value <.001). The standardized factor loadings for the path between the formal and informal drivers is also non-trivial (.38), indicating both the statistical and

economic (i.e. magnitude of estimated coefficients) significance of formal institutions role in fostering informal collaborative dynamics, which in turn positively influence collaborative capacity. While this offers preliminary support for hypothesis 2a, which posits the indirect, yet significant influence of formal institutions on collaborative capacity the significance of indirect path is not a mere aggregation of two individual paths. Beta estimates for the indirect path and its significance need to be determined separately. Table 1-4 reports standardized coefficients for all paths along with the results for indirect and total paths of formal drivers at the bottom. Both indirect and total paths are significant below .01 level ($p=.001$ for indirect path and $p=.002$ for total path), providing solid evidence for the role of formal drivers in shaping collaborative capacity through the mediating role of informal drivers.

This supports the hypothesis that while formal institutions do not directly account for the variations in trust and reciprocal relationships among city departments, they indirectly promote such relationships through informal collaborative dynamics. The presence of formalized institutions for collaborative management may help casual interactions for building trust and mutual trust in several ways. Research explains that formal mechanisms can be crucial in the early stages when partners are needed to be brought together to initiate collaborative dialogues and understanding. They can also help oblige the partners to re-engage should conflicts and the abandonment of the collaborative ties occur in the process (Lam 2005; Parker and Brey 2015; Provan and Milward 1995). Institutionalized monitoring and rewarding schemes can confirm expectations and consequences for deviations from agreed goals during the later stages of collaboration. This supports the view that traditional bureaucratic paradigms, such as written agreements, statutory rules, and mandatory directives, are not necessarily at variance with informal aspects of governance paradigm. Together both contribute to forging collaborative regime, albeit informal mechanisms may be more directly responsible for shaping collaboration.

[Table 1-4]

Table 1-4 also reports the results of model fit indices. Overall, the fit statistics support for a good model fit⁵: RMSEA=.053 (good fit <.08); RMSEA CI = .046–.060 (good fit=.03–.08); SRMR=.058 (good fit <.08); CFI=.992 (good fit >.90); TLI=.989 (good fit >.95). Model Chi-Square statistic is a traditional measure for evaluating overall fit of a structural model and insignificance indicates a good model fit. Unfortunately, it was not achieved with the current research model, yet, this was expected given the nature of the data and a sample size this study employs; Chi-square significance is sensitive to normality assumptions and a sample size and particularly it almost always results in model rejection when moderate-sized samples (>200) are used (Hair et al., 2006; Jöreskog and Sörbom, 1993). Therefore, research notes its limitation as a sole criterion for goodness-of-fit and recommends using a combination of several alternative indices to determine how the theorized model fits the data. As shown above, all fit statistics fall within the acceptable range of good model fit, thus taken together, they suggest that the hypothesized model of this study fits the data well.

Conclusion

In order to be effectively addressed, many modern policy challenges require integrative responses that transcend traditional administrative silos. Broad objectives like sustainability, for example, often require action from multiple departments in a typical city government, which can lead to problems of fuzzy boundaries, limited accountability, and externalities - and generally create incentives to free-ride. This in turn puts a premium on the institutionalization of integrative mechanisms able to overcome functional collective action dilemmas (Feiock, Krause and Hawkins 2017). However, relatively little is known about how local governments

⁵ Abbreviations: Root Mean Square Error of Approximation (RMSEA); Standardized Root Mean Square Residual (SRMR); Comparative Fit Index (CFI); Tucker-Lewis Index (TLI).

successfully mitigate the coordination and collective action challenges that arise between departments when they pursue city-wide objectives. This chapter examined the administrative landscape of U.S. local governments' in implementing sustainability policies and how formal and informal types of institutional arrangements are related to collaborative capacity of sample cities. Scholars observe that collaborative institutions tend to display less hierarchical and fluid arrangements than that experienced in traditional bureaucracies. Emphasis on interpersonal relationships and informal mechanism stems from the expectation that such arrangements are conducive to iterative engagement, through which participants cultivate mutual trust and shared understanding – the glue that hold networks together. The results of this study provide additional evidence of the positive relationship between informal collaborative dynamics and collaborative capacity.

Interestingly however, the results also show that formal institutions, while not having a direct relationship with the outcome variable, forms an indirect relationship through the mediating role of informal collaboration dynamics. This supports the view that informal determinants of collaborative network are essential ingredients of cohesive network, yet statutory and mandatory rules are also important for forging and reinforcing the cohesion factors. A few studies in the past have revealed these combined collaborative dynamics through case studies, yet this study is among the first that quantitatively models and statistically verifies the interplay between formal and informal drivers of collaboration. The results suggest that practitioners considering initiating or expanding their collaborative ties should benefit from utilize both strategies, although informal mechanisms maybe primarily used to facilitate engagement among participants. Striking a balance between the two will be the key to understand the full effects of different dynamics, which is an opportunity for future research. Longitudinal data is certainly desired to that end.

This research is not without limitations. One comes from the nature of empirical evidence that this study offers. The major objective of the research was to capture a macro-perspective on some common threads of collaborative behaviors among U.S. city governments. Thus, it does not offer an up-close observation on the dynamics that occur under the various combinations of informal and formal mechanisms, such as the varying qualities of informal gatherings and the degree to which fair, open and inclusive communications develop through face-to-face meetings and ad hoc meetings. A plethora of cases studies inform us that collaboration is heterogeneous depending on when, where and under what specific circumstances collaborative arrangements surface and unfold. Future research will benefit from a mixed method approach to understand both generalize-able common features of institutional mechanisms for collaboration deduced from large N data as well as how these commonalities are also institutionalized in different contexts and how the social norms and reciprocity expectations embedded in the particular context mediate the causal stories.

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Tables and Figures

Table 1-1. Survey Questions Used for Variables (mean scores in parenthesis)

<i>Collaborative Capacity</i>	
To what extent do you agree or disagree that the following statements describe collaboration on sustainability among units in your city/town? (4-point Likert Scale)	
Units fulfill commitments they make to one another	(3.23)
Representatives from different units trust one another	(3.29)
Unit heads are generally willing to take risks	(2.72)
Units share information openly	(3.10)
Collaborating units agree about overarching sustainability goals	(2.83)
<i>Formal Drivers</i>	
To coordinate sustainability implementation, units utilize... (5-point Likert Scale)	
Directives from mayor or manager	(3.40)
Formal agreements that require consent of department managers	(2.44)
Mandated collaboration by the manager or elected officials	(2.54)
Appointed/standing task force	(2.59)
<i>Informal Drivers</i>	
To coordinate sustainability implementation, units utilize... (5-point Likert Scale)	
Informal communication with department directors	(3.72)
Ad-hoc meetings among	(2.95)
Unplanned face-to-face interactions among staff	(3.10)
Self-organized task force among departments	(2.71)
<i>Priority</i>	
To what extent are the following dimensions of sustainability a priority for your city/town? (5-point Likert Scale)	
Environmental sustainability	(3.67)
Climate change mitigation	(2.73)
Climate change adaptation	(2.70)
<i>Institutional Capacity</i>	
To what extent are each of the following an obstacle to your city/town's ability to achieve greater community sustainability? (5-point Likert Scale)	
Cost/lack of funds	(4.2)
Lack of staff capacity or expertise	(4.1)
Lack of informational resources	(2.6)
<i>Lead Agency</i>	
Compared to other government units, how much of the responsibility for managing the implementation of the city/town's sustainability initiatives does your unit have? (2.34)	
It is one of several essentially equal players	
It has slightly more responsibility than other units	
It has the bulk of responsibility	
It is entirely responsible	

Table 1-2. CFA Measurement Model: Standardized Loadings

Indicators	Collabo Capacity	Formal Drivers	Informal Drivers	Priority	Inst. Capacity
Units fulfill commitments	.77				
Units trust one another	.86				
Willing to take risks	.75				
Units share information openly	.59				
Agree about sustainability goals	.95				
To coordinate, units utilize...					
Directives from the top		.85			
Formal agreements		.84			
Mandated collaboration		.75			
Appointed/standing task force		.90			
To coordinate, units utilize					
Informal communication			.97		
Ad-hoc meetings among staff			.73		
Unplanned face-to-face meetings			.68		
Self-organized task forces			.65		
Priority for our city/town					
Environmental sustainability				.71	
Climate change mitigation				.96	
Climate change adaptation				.92	
Obstacle					
Funds					.55
Staff capacity/expertise					.72
Informational resources					.82
Composite Reliability (CR) (>.7)	.89	.90	.85	.90	.74
Average Variance Extracted (AVE) (>.5)	.63	.70	.59	.76	.50

N=508; All loadings shown in this table significant at $p < .001$

Table 1-3. Construct Correlation Matrix (Standardized)

	(1)	(2)	(3)	(4)	(5)
(1) Collaborative Capacity	1.00	.02	.06	.04	.07
(2) Formal Drivers	.15**	1.00	.15	.08	.01
(3) Informal Drivers	.24***	.38***	1.00	.10	.02
(4) Policy Priority	.19***	.29***	.31***	1.00	.06
(5) Institutional Capacity	.27***	.08	.14*	.25***	1.00

*** indicates p-value <.001; ** p-value <.01; * p-value <.05

Table 1-4. SEM Results on Collaborative Capacity

		<u>Beta Estimates for Individual Paths</u>			
From	To	Effects	Std. Effects	z-value	
<i>Collaborative Dynamics</i>					
Formal Drivers ξ_1	Collaboration η_2	.048	.045	1.21	
	Informal Drivers η_1	.414***	.382***	7.52	
Informal Drivers η_1	Collaboration η_2	.173***	.176***	3.98	
<i>Controls</i>					
Institutional Capacity ξ_2	Collaboration η_2	.231***	.216***	4.33	
Policy Priority ξ_3	Collaboration η_2	.075	.070	1.43	
Lead Agency x_1	Collaboration η_2	.075	.070	1.40	
		<u>Beta Estimates for Direct, Indirect and Total Effects</u>			
From	To	Direct	Indirect	Total	
Formal Drivers ξ_1	Collaboration η_2	.047	.067**	.112**	

N=508
 *** indicates p-value <.001; ** p-value <.01; * p-value <.05
 RMSEA=.053; RMSEA CI = .046-.060; SRMR=.058; CFI=.992; TLI=.989

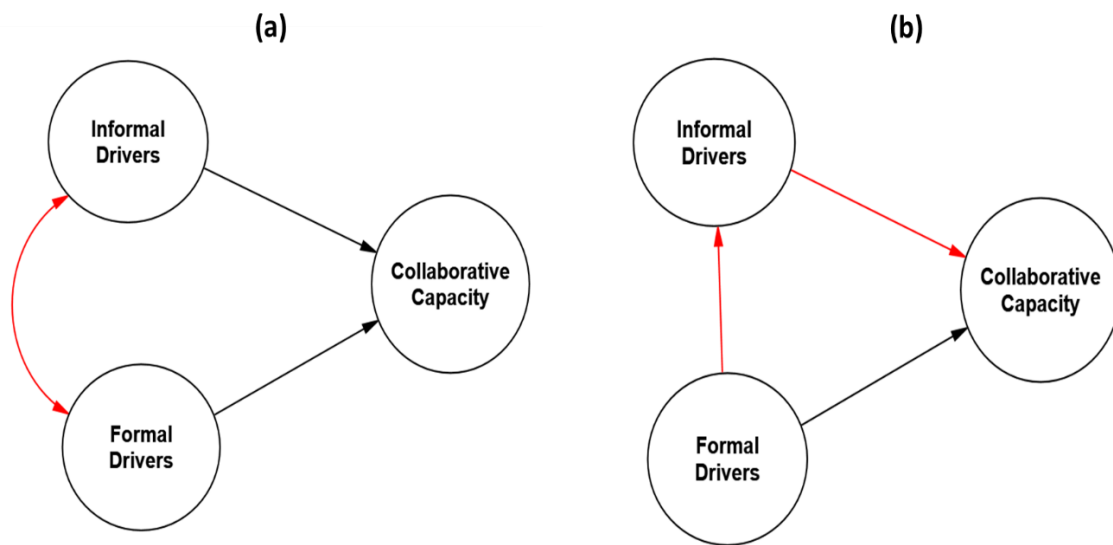
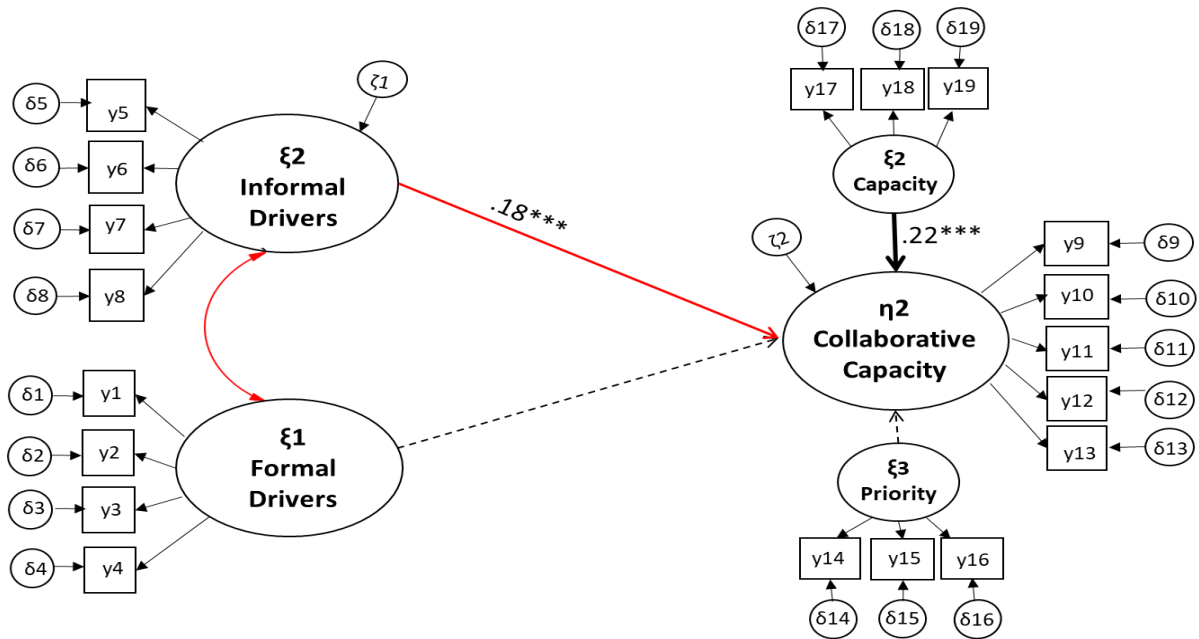
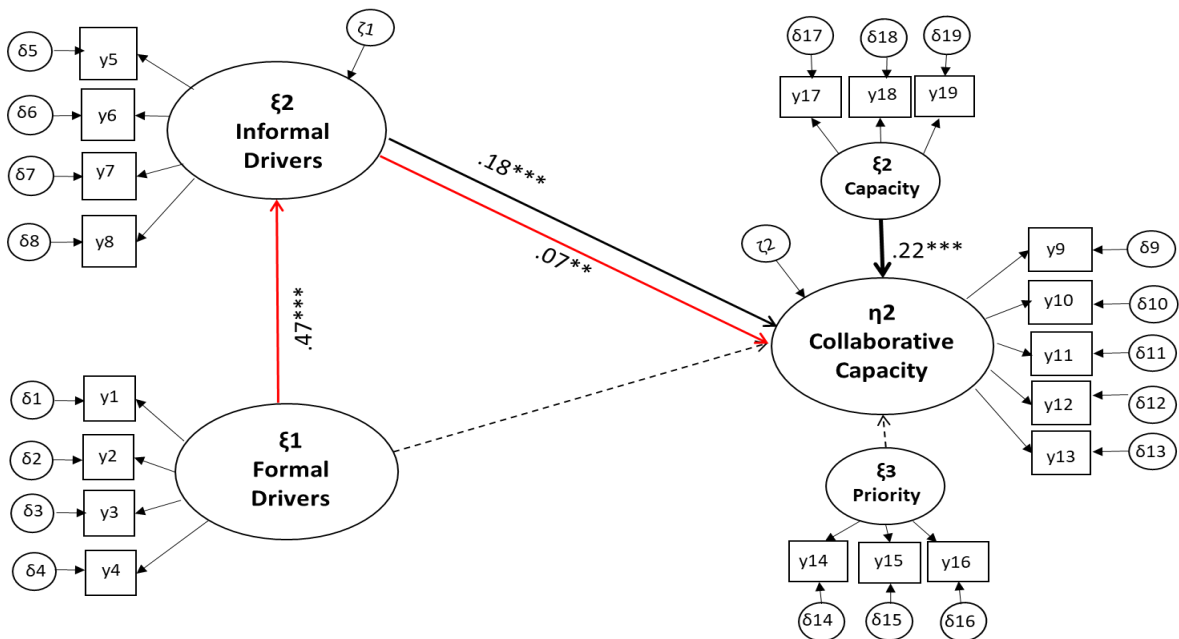


Figure 1-1. Theoretical Models for Direct and Indirect Paths



Model (a)



Model (b)

Notation for SEM

Symbols	Definition
ξ	The latent exogenous variables
η	The latent endogenous variables
δ	Errors for the observed exogenous variables
ζ	Errors for the observed endogenous variables
x	The observed exogenous variables
y	The observed endogenous variables
ζ	Error for the latent endogenous variables

* Notation for paths is not indicated.

Figure 1-2. Structural Equation Modeling Results

Chapter 2 Unveiling local sustainability performance management: Understanding the use of performance information by U.S. local governments for advancing sustainability goals

Introduction

Kirkwood is a western suburb of St. Louis County, Missouri. The town is small, with a population of only around 30,000, but it is at the forefront of sustainability or clean energy efforts in the region. The city is driving major clean energy projects using data obtained from the city's greenhouse gas (GHG) emissions inventory, as well as other performance indicators. Mark Petty, the director of the city's Electrical Department, explains that it was this data-driven approach that enabled them to win bipartisan support and eventually led to successful implementation of the projects (ICLEI 2018b).

A data-driven approach to sustainability is emerging. In Minnesota, a regional partnership was formed among 22 municipalities to estimate the impacts of their sustainable practices by tracking and sharing data on the costs and GHG emissions of each city (Urban Land Minnesota Institute 2019). On the other hand, in Washtenaw County, Michigan housing affordability is assessed in conjunction with public transit accessibility and other amenities, to arrive at a more holistic conception and measurement of social sustainability (ICMA 2014). Given the municipalities' emerging interest in measuring sustainability actions and performance, research is needed to understand the practice and what may help them advance it further. It is particularly important to understand if and how local governments use – not just measure – the performance information for sustainability management. Through the ebbs and flows of optimism about performance measurement over the decades, we have learned that simply adopting a performance measurement system does not necessarily lead to either its proper use or an improvement in performance (Melkers and Willoughby 2005; Ho 2005;

Moynihan 2008). The weak link between performance measurement and its benefits has generated significant research interest as to what mediates this relationship. Now research better explores this inquiry by making a useful distinction between performance measurement and management. While the former refers to efforts to define, monitor and report program progress and results, the latter extends the concept to include the use of performance information generated by the system (de Lancer Julnes and Holzer 2001; Sole 2009; Yang and Hsieh 2007). Here, *the use of performance information* plays a key role in both distinguishing between performance measurement and management, and explaining why a weak link often exists between the system and the benefits it supposedly delivers. Many public management scholars argue that, in order to fully realize the benefits of performance management, it is crucial to understand performance information use and how to make it part of ongoing and repetitive management efforts.

A growing body of research on public sector performance management is taking on this inquiry, and there is now general agreement in the literature that an institutional context, in which performance management is practiced, can have a major influence on performance information use. A host of factors are suggested as significantly affecting information use. Some identify formal features of an organization, such as administrative infrastructure and capacity, as major determinants of information use (Berman and Wang 2000; Holzer and Yang 2004), while others focus on soft aspects, including institutional culture conducive to innovations and learning (Folz, Abdelrazek, and Chung 2009; Johansson and Siverbo 2009; Moynihan and Pandey 2010; Moynihan, Pandey, and Wright 2012), stakeholder involvement (Berman and Wang 2000; Ho 2005; Moynihan and Pandey 2010), and leadership support (Dull 2009; Moynihan and Lavertu 2012; Yang and Heish 2007).

Based on these discussions, this chapter examines the patterns of performance information use among local governments in sustainability management, and how those

patterns are related to various institutional (e.g. capacity, culture) and non-institutional (e.g. community characteristics) conditions. While sustainability itself is a widely-researched area across a range of disciplines and topics, sustainability performance management is a seriously under-explored research topic. Despite the heightened interest in sustainability and the following aggressive adoption of commitments by local governments, little research exists as to understanding the needs of local governments in tracking and using performance information for sustainability management, and what may support their needs. Evidence is mostly found in best practices and case studies to share the experience of those who are at the forefront of the data-driven approach to sustainability management. While case studies offer an invaluable source of information for understanding local sustainability performance management, generalizing findings from a single case study is also limited, needing large-N research for an overall yet systematic view of local sustainability performance. This study fills this gap. It investigates institutional conditions that support local governments' developing interest in sustainability performance management by using a novel dataset that merges data from an original nationwide survey on local sustainability performance with information on U.S. demographics and forms of government.

The study proceeds as follows: It first reviews how research surrounding performance management has evolved to emphasize the role of performance information use. It then explains and develops hypotheses for primary institutional factors that extant research identifies as essential for driving performance information use. Hypotheses are tested using both observed data and multiply imputed data to help mitigate any potential biases arising from missing values. Results estimated from both types of data are presented. The paper concludes with policy implications from the research findings and suggestions for future research.

Literature Review

Performance Management in Public Sector

For the past decades, we have witnessed a pervasive movement of performance management at all levels and parts of governments. Although the history of performance management goes back to the turn of the 20th century, it has rapidly expanded over the past two decades under the market-oriented doctrines of New Public Management (NPM) and several major pieces of legislation that stipulate institutionalizing performance management among government agencies, including the Government Performance and Results Act (GPRA) (Holzer and Yang 2004; Gazell 1997; Kettner, Moroney and Martin 2012). In response to the intensified interest in performance management, substantial research efforts have been put into unraveling the promises and pitfalls of the performance management movement. Expected benefits of performance management include efficiency gains, enhanced program effectiveness, increased transparency, and many more. Among them, its potential for enhancing democratic accountability particularly stands out. In the current governance context, where the production of public services is increasingly decentralized, performance management can be an important apparatus through which government accountability is ensured by publishing program/service results and subjecting them to public scrutiny (Galera et al. 2014; Hays and Kearney 1997; Melkers and Willoughby 2005; Moynihan 2008; Radin 2006; Taylor 2009). As such, performance measurement and the information it produces, when utilized carefully and properly, can drive policy improvements and innovations, thus benefiting society.

However, such positive expectations about performance management remain largely normative, as a non-trivial number of studies find insignificant and sometimes even perverse effects of performance management practice, noting “the gap between rhetoric and reality.” (Ammons and Rivenbark 2008; Melkers and Willoughby 2005; Ho 2006; Moynihan, 2008; Radin 2006) The missing link between the adoption of a performance system and the benefits

expected of the system is said to be *the lack of use of performance information*. Decades of research on public-sector performance management reveal that the adoption of a performance reporting system does not necessarily mean, nor automatically lead to, the utilization of the information the system generates (Berman and Wang 2000; Melkers and Willoughby 2005; Taylor 2009). Many explain that effective performance management remains a puzzle and the major reason is the under-utilization of collected information (Berman and Wang 2000; Moynihan and Pandey 2010). Thus, in order to address concerns surrounding the underperformance of performance systems, a better understanding of the use of performance information is required: what defines it and how to promote it. Moynihan (2009) identifies four major types of performance information use: passive (data collected for compliance purposes, but rarely used); political (data primarily used for external communication to improve legitimacy and/or accountability); purposeful (data interpreted and used for internal management); and perverse (data use resulting in a goal displacement).

Among the four Ps, purposeful use has received the most research attention, as it is seen as having the greatest potential for meeting the normative expectations and promises promoted by performance reforms among public agencies (Kroll 2015). Research increasingly finds that organizational efforts to simply collect performance information without feedback mechanisms for internal management are often futile (Berman and Wang 2000; Melkers and Willoughby 2005; Taylor 2009). In the area of sustainability too, a recent study finds that substantially more local governments in Europe measure their sustainability efforts than before, but mostly practice passive sustainability performance management, which involves a mere disclosure of information without utilizing it for any particular purposes (Niemann and Hoppe 2017). When the use of collected information is unclear, performance reporting likely becomes another layer of administrative burden or a mere outlet for “greenwashing.” (Dumay, Guthrie, and Farneti 2010, 543) Indeed, the issues of ‘reporting fatigue’ and the resulting

discontinuation of the reporting, which commonly appear in general performance management practices, have also been reported in the sustainability context (Niemann and Hoppe 2018). Therefore, much of the research discussions and evidence accumulated over the past years focuses on the purposeful use of information. This research also considers the purposeful use of performance information in local sustainability management. For simplicity, the use of performance information in the following sections refers to the purposeful use of performance information.

Performance Information Use and Institutional Drivers

If we are to fully realize the benefits performance measurement supposedly delivers, information generated by the performance system must be interpreted, contemplated, and incorporated into program management. Yet, establishing such routines of deliberately incorporating performance information into management requires a form of behavioral change among organizational members; thus, what shapes such a behavior becomes an important question (Kroll 2015; Moynihan and Pandey 2010). Research on the drivers of performance use is growing steadily, yet in a somewhat fragmented way. There is general agreement in the literature that institutional conditions matter for fostering performance information use, yet disagreement persists over the specifics of what, when, and how they matter.

Synthesizing efforts in the literature are rare, but not unprecedented. Kroll (2015) reviews 25 studies that examined the drivers of purposeful information use and evaluates how consistently the reported significances hold across studies using a simple vote-count analysis, i.e. counting the frequency of a variable being found significant – or insignificant – in original studies. While providing a literature review in a structured fashion, a vote-count analysis neither estimates effect sizes nor takes account of heterogeneity in study design and modeling. A meta-regression analysis achieves this end by modeling research design elements, yet

conducting a meta-regression is not always possible, as it requires an overall maturity of literature to secure a sufficient number of studies to be included in a regression model. In such cases, where the literature still needs more empirical accounts to achieve improved generalizability, another way to synthesize or systematize research evidence is a broad classification or categorization of key parameters using established theoretical frameworks. For example, de Lance Julnes and Holzer (2001) use two prominent models of organizational behavior – the rational model and the political model – to group different performance drivers and examine how they explain different stages of performance measurement. They find that rational factors, such as internal requirements and resources, are significantly linked to the adoption of a performance measurement system, while political factors, including interest groups and risk-taking culture, are more relevant for the implementation of the system. In a similar vein, Moynihan and Landuyt (2009) take structural and cultural approaches to understanding organizational learning and find the intertwined relationship between the two.

While the theoretical frameworks these two research works employed are different, the core idea underpinning both is rooted in two major traditions of organizational theory: the rational choice institutionalism and sociological institutionalism. The former largely depicts organizations as instrumental whose primary interests lie in maximizing their rationally-calculated utility, while the latter sees organizations as social actors whose actions need to be explained in cultural terms and their surrounding contexts (Hall and Taylor 1996; Lounsbury and Ventresca 2003). Following these two major intellectual traditions that explain organizational behavior, this chapter extends the synthesizing and theory-building efforts by not only estimating the significance of individual institutional factors, but also situating the discussion of estimated findings in a larger theoretical context. The following section discusses the rational and sociological approach in more detail and develops hypotheses for each.

Hypotheses

Rational Choice Approach to Purposeful Information Use

As with any managerial reforms, institutionalizing the practice of information use necessitates some fundamental changes to what is already established in an organization, such as procedures and norms, which then likely involve a non-negligible degree of fear and resistance to the change (de Lance Julnes and Holzer 2001). Therefore, for any organizational change to successfully occur, an environment for change must exist (Streib and Willoughby 2005). In order to create an institutional context conducive to change, it is necessary to understand what shapes organizational behavior and what could potentially mediate the change process.

For rational choice theory, or its more realistic variants, such as the bounded rationality model (Simon 1947), what drives organizational change is the strategic calculation of benefit and costs associated with the change, otherwise known as Logic of Consequences. Any organizational activities and transactions involve costs, and the goal is always to minimize the costs and maximize benefits by enhancing means-ends efficiency. For this reason, the development – or modification – of any institution is explained by reference to how it minimizes “the transaction costs of undertaking the same activity without such an institution.” (Hall and Taylor 1996) From this perspective, establishing the routines of performance information use incurs costs and, thus, institutions that can minimize them play an important role in furthering the change. This can be done by, for example, improving technical infrastructure of an organization, such as quality system and IT support, or providing necessary resources and training to enhance employees’ capacity to process information and perform the task. Thus, a failure to establish such a routine is largely explained by the presence of incapability and technical irrationality within organizations (de Lance Julnes and Holzer 2001).

Based on these discussions, I consider the following rational factors and examine how they shape the behavior of local governments in sustainability performance management.

Measurement System Quality

One of the foremost factors that influence performance information use is the quality of measurement system. A quality measurement system is founded on sophisticated metrics that are characterized by several qualities, including measurability, reliability, validity, and relevancy (Ammons and Rivenbark, 2008; Melkers and Willoughby 2005). Measurability captures the ease of use for the system, while the rest are the qualities necessary to produce quality information. Metrics that require excessive efforts to measure are likely to remain unused and discarded, making data collection efforts patchy and intermittent (measurability). Metrics that are not objective, requiring too much subjective interpretation (reliability), or are not aligned with organizations' mission and strategic goals (validity), are also unlikely to be helpful in understanding how an organization is progressing. It is also important that metrics produce information that is practically relevant to management (relevancy). Shifting attention in both research and practice from workload measures to high-order measures (e.g. effectiveness and efficiency) is also this realization that a focus on raw numbers or workloads is unlikely to have meaningfully relevant policy and managerial implications to operating officials (Ammons and Rivenbark 2008). On the other hand, the comprehensiveness of the performance system could also be a proxy for system quality. Several studies find an increased level of performance information use, when information is collected more frequently and extensively across organizational programs and activities (de Lancer Julnes and Holzer 2001; Ho 2006; Melkers and Willoughby 2005; Moynihan 2005; Yang and Hsieh 2007). Based on these discussions, it is hypothesized that:

H1: Performance information use is more likely, when quality measures are present, represented through the degree of reliability, measurability, validity, and relevancy.

H2: Performance information use is more likely, when information is collected more frequently and extensively across organizational activities and programs.

Institutional Capacity

Institutional capacity is another important factor that influences performance information use. Research often identifies capacity as a vital precondition to successfully administer policy and managerial innovations (Berman and Wang 2000; Johansson and Siverbo 2009). Institutional capacity is not unidimensional. A broad conceptualization of capacity consists of tangible (e.g. financial and technological resources) and intangible (e.g. staff knowledge, skills and stakeholder support) dimensions (Wang et al. 2012). Specifically relating to performance management, IT infrastructure, such as analysis software programs and databases, and staff members who are capable of data analytics, must exist to create and maintain a performance management system (de Lancer Julnes and Holzer 2001; Niemann and Hoppe 2018; Sanger 2008). Without those resources available, performance information is likely to be collected and used in an ad-hoc and unreliable fashion. Thus, the following two hypotheses are developed:

H3: Performance information use is positively associated with the level of an institution's human capacity to manage and analyze data.

H4: Performance information use is positively associated with the level of an institution's technological resources to manage and analyze data.

Goal Clarity

The last rational factor is goal clarity, or goal orientation. The instrumentality of goals as a managerial tool to improve organizational reasoning has long been noted in organization science research. Goals provide value premises or a set of constraints on which organizational members base their decisions and behaviors; thus, the more precise value premises an organizational goal can supply, the more likely the organization effectively controls the organization as intended (Simon 1964). For this reason, goal clarity is frequently linked to explaining organizational performance and change (e.g. Chun and Rainey 2005; Resh and Pitts 2013). Likewise, the more actively and frequently organizational goals are discussed and evaluated, the more likely performance information is appreciated and utilized by organizational members (de Lancer Julnes and Holzer 2001; Moynihan and Landuyt 2009). Goal clarity can be a particularly important determinant of performance information use in sustainability management. Among the major challenges facing local governments for advancing sustainability efforts, one rises from the broad nature and ambiguous definition that prevent local governments from setting clear goals and practical steps towards the goals. This is why a large volume of research on sustainability is concerned with defining sustainability and refining its indicators for research (e.g. Adams, Muir, and Hoque 2014; Domingues et al. 2015; Williams, Wilmshurst, and Clift 2011). For this reason, cities where sustainability goals are clearly communicated to employees are likely interested in measuring and using information to track progress toward the goals. Thus, it is hypothesized that:

H 5: Performance information use is more likely when organizational members share a clear goal.

Sociological Approach to Performance Information Use

In contrast to the rational approach, the sociological institutionalism sees organizational behavior and decision-making not as driven by instrumental rationality, but by value-laden

interpretation of a broader cultural and social environment surrounding the organization (DiMaggio and Powell 1983; Frumkin and Galaskiewicz 2004; Hall and Taylor 1996; Lounsbury and Ventresca 2003; Watkins-Hayes 2011). This school of thought poses a fundamental challenge to the rationality assumption and argues organizations “often adopt a new institutional practice, not because it advances the means-ends efficiency of the organization but because it enhances the social legitimacy of the organization or its participants.” (Hall and Taylor 1996). The question of what defines an appropriate or legitimate action becomes an important guiding logic, also known as Logic of Appropriateness (DiMaggio and Powell 1983; Frumkin and Galaskiewicz 2004; Scott 1987). From this point of view, it is not too difficult to understand the limited use of performance information for much beyond collecting and reporting; local authorities would adopt performance measurement and report the numbers as a strategic choice to promote themselves as rational actors who are able to make informed and efficiency-driven decisions in the management of their local resources or as a response to the pressure from their stakeholders to be so, not necessarily because they are interested in achieving efficiency (Ammons and Rivenbark 2008; Gupta, Dirsmith and Fogarty 1994; Taylor 2009).

Because the sense of appropriateness is largely shaped by the environment or the contexts surrounding the organization, institutions here are defined in a broad sense. Culture, symbols, and norms that provide the “very terms through which meaning is assigned” are all included beyond just formal rules and structures (Hall and Taylor 1996). Therefore, institutions that can reinforce the positive perceptions of performance information use are important for establishing it as part of the administrative routines. This includes creating a belief system within an organization that performance information use is socially desirable and legitimate or establishing culture conducive to such use, such as, a culture that values organizational learning and innovation. Based on this discussion, I consider the following sociological factors and

examine how they shape local governments' behavior in sustainability performance management.

Culture

Organizational behavior and institutional theorists have long established a body of empirical evidence about the role of culture in shaping organizational behavior. The culture that verbalizes the importance of achieving results from programs and policies creates a performance-oriented culture conducive to the use of performance information. Inculcating result-driven mindsets among employees naturally accompanies dialogues about monitoring and evaluating program progress and statistics which, in turn, encourages the staff to survey the collected information more frequently (de Lancer Julnes and Holzer 2001; Moynihan, Pandey, and Wright 2012; Sanger 2008). Another key aspect of performance-oriented culture is organizational learning; an organization's ability to develop and apply information and experience to the management of its activities and programs (Moynihan and Landuyt 2009). A culture that emphasizes the value of learning is likely to encourage employees to appreciate performance information as a resource for learning. Organizations that are open to new ideas and change can also promote organizational learning and innovation through the exchange of new ideas, thereby making information a relevant and important part of management (Folz, Abdelrazek, and Chung 2009; Johansson and Siverbo 2009; Moynihan, Pandey and Wright 2012). Based on this, it is hypothesized that:

H6: Performance information use is more likely when an organization has cultivated a performance-oriented culture where learning is encouraged, and achievement of results is emphasized.

Stakeholder Involvement – Leadership

The top management, such as political leaders (council members and a mayor) and chief administrative officers, is an important stakeholder for public agencies. They are treated here separately from other stakeholders (see below), given their consequential impact on shaping an institutional context. In most cases, the likelihood that public organizations will successfully institutionalize an organizational change is largely dependent on the degree to which it successfully garners support from the top to overcome any resistance toward the change and/or pool together necessary resources (Berman and Wang 2000; Fernandez and Rainey 2006). Likewise, employees' enthusiasm for performance data can quickly wane when elected officials and senior managers show an indifferent or "hands-off" approach to performance management practices (Boyne et al. 2004). Thus, showing an interest in such practices by participating in measurement selection and review processes can signal that they care about the information generated by those measures and thus promotes the utilization of the information for making informed decisions. Therefore, it is hypothesized that:

H7: Performance information use is more likely when the leadership is engaged in performance measurement design and review processes.

Stakeholder Involvement – Bottom-up

Political leaders and top management personnel are vital, yet not the sole influencers. Public organizations have several stakeholders, both internally and externally. Support from external stakeholders, notably the public, and knowing that they care about their government performance, adds "political weight" and pressure the continuing use of performance information for enhanced transparency and accountability (Ho 2006; Moynihan and Hawres 2012; Moynihan and Ingraham 2004). Such grassroots engagement can be particularly important in the context of sustainability. As discussed above, sustainability initiatives are not of primary focus in many instances and, thus, face increased legitimacy concerns. Community

interest in sustainability performance can provide local governments with an important force to legitimize their sustainability efforts and further reinforce the use of performance information. Thus, engaging the public in a feedback loop for designing and evaluating performance indicators can encourage an increased level of performance information.

Another stakeholder that can positively impact information use is employees who are tasked with collecting and using performance information for program management. Studies observe frequent information use in organizations where employees are included in measurement selection and review processes (Dull 2009; Melkers and Willoughby 2005). Research indicates employee engagement can boost their sense of ownership over the information generated by those measures, thereby increasing the use of the information. Thus, it is hypothesized that:

H8: Performance information use is more likely when the public is involved in performance measurement design and review processes.

H9: Performance information use is more likely when the employees are involved in performance measurement design and review processes.

Table 2-1 lists all 9 hypotheses. Next section describes data and model.

[Table 2-1 about here]

Data and Model

Data

The above hypotheses are tested using data from an original survey that was conducted from October 2018 to January 2019. Survey data were merged with census information to see if community characteristics are related to different types and levels of performance data use. Information on the form of government was also included to see if information use differs depending on the forms of government. Extant research reports limited government-initiated

sustainability activities in small rural areas; thus, the survey targeted a sample of local governments in cities and towns with populations over 20,000 (n=1282). An electronic survey was sent to a city government staff member whose position is primarily responsible for developing, implementing, and overseeing city-wide sustainability programs and policies. An appropriate survey recipient was identified through multiple rounds of web-search⁶ and in collaboration with the Urban Sustainability Directors Network (USDN). For a small portion of the sample (75 contacts), the delivery of the survey failed despite multiple attempts. Excluding these, a total of 443 responses were received, resulting in a response rate of 37%. Among the responses collected through USDN, two cities had populations under 20,000 and, thus, were also excluded from the analysis.

In order to improve construct validity and minimize measurement error, respondents were given a definition of sustainability prior to individual questions being asked. Sustainability is a term plagued with ambiguities and modifications. Reportedly, there are now over three hundred definitions of ‘sustainability’ found within environmental domains and other related disciplines (Santillo 2007). Since the primary interest of this study is to understand institutional characteristics promoting sustainability performance information use, rather than refining the definition or the measures of sustainability, it employs one of the most widely-known and commonly-cited definitions of sustainability, as famously put forth by 1987’s Brundtland Report: sustainable development is “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Sustainability in this study thus encompasses a wide range of issues that fall within the interlinked realms of economy, environmental, and social well-being. This was explained in

⁶ Primary contacts were identified by visiting every city government website, using such terms as “sustainability,” “sustainable development,” “sustainable communities,” “social sustainability,” “long-range planning,” and “smart growth.” In cases where it was not possible to locate a chief person tasked with administering sustainability efforts, the list includes a city manager or mayoral address.

the beginning of the survey, followed by a list of program and activity examples for each dimension of sustainability to further clarify what each construct of environmental, economic, and social sustainability entails. Examples of activities are drawn from a work by Saha and Paterson (2008), who identified most adopted sustainability programs in U.S. local governments through a rigorous 3-step process, consisting of a literature review, a professional panel review and, finally, a nationwide survey. Example programs include, but are not limited to: open space preservation, energy efficiency, and renewable energy use for environmental sustainability; infill, brown-field redevelopment, and empowerment zones for economic sustainability; and affordable housing, homeless intervention, and neighborhood planning for social sustainability.

A careful inspection of the sample data revealed the presence of missing values. Most statistical software programs, by default, use Complete Case Analysis (CCA), also known as listwise deletion, which removes rows with any missing values from a regression analysis. This has been long denounced in literature because it is conditioned on Missing Completely at Random (MCAR) – a strong assumption to meet unless a study utilizes randomized experiments⁷. A failure to meet such a strong assumption is likely to result in estimation biases and misleading results (Lall 2015). It is also problematic because even if a row has only one missing value with the rest filled in with complete data, the whole data for a given row is discarded under CCA, which then results in reduced statistical power and inefficient estimation (Curley et al. 2019). This is an indication that the data is Missing at Random (MAR) where missing values are dependent on observed variables, thus, the issue is further addressed through Multiple Imputation processes. Since the data employed in this research is MAR, missing values were imputed using Multiple Imputations using chained equations (MICE) to allow

⁷ Little's test also indicated a strong significance, indicating the data employed in this research is not MCAR.

separate conditional distributions for each imputed variable, since the study model has both binary and count variables. Detailed descriptions of the imputation processes and the summary statistics are provided in appendix 1 and 2, respectively.

Model

The primary objective of this chapter is to examine which of the rational factors (system quality, capacity and goal clarity) and sociological factors (performance-oriented culture and involvement and feedback from various stakeholders) are related to the increased use of performance information.

To operationalize performance information use, an index is developed following several research works, including Moynihan, Pandey and Wright (2012) who developed an index of performance information use using four items. This study employs the following four items for purposeful use: if the respondent's organization uses collected performance information for 1) setting sustainability priorities; 2) improving existing programs; 3) making rewards; and 4) communicating with departments involved in the implementation of sustainability programs. The following independent variables are included: *System Quality* has two variables: the measurement comprehensiveness and metrics quality. *Measurement comprehensiveness* captures both the scope and frequency of data collection. Respondents were asked if and how often they collect performance information in the following 6 broad categories of activities on a scale of 1 to 5 from never to several times a year: energy conservation, environmental protection, smart growth, local business promotion, social equity and community well-being. *Metrics quality* is a composite variable consisting of multiple items that reflect key qualities that extant literature identifies as constituting a well-developed performance measurement. The survey asked if metrics are measurable, objective, and linked to strategic goals across the three dimensions of sustainability – environmental, economic, and

social sustainability. It also asked the extent to which the metrics are perceived to produce information relevant to management. A total of 12 items were rated on a scale of 1 to 10 and showed very high internal consistency (Cronbach's $\alpha = 0.94$). Therefore, an average was estimated to arrive at a single score that represents the quality of metrics. For *Capacity*, recipients were asked to rate, on a scale of 1-10, the extent to which they agree that their organizations have staff members and technology resources to analyze performance data. *Goal Clarity* represents the degree to which departments involved in sustainability share a clear sustainability goal on a scale of 1-10.

To operationalize *Performance-oriented culture* the following three variables were used: the degree to which leadership emphasizes achieving results from policies and programs; embraces new ideas; and encourages learning from mistakes. All three items were measured on a scale of 1-10. Factor analysis was conducted to identify the latent construct and one factor was obtained (Cronbach's $\alpha = .85$, Eigen value = 1.83). Stakeholder involvement was assessed for the following three main actors on a binary scale: *Leadership involvement* asked if both political and administrative leaders, including elected officials, city manager, and department heads, are involved in measurement design and review processes, while *Employee involvement* captured if employees who are tasked with using performance information were engaged in such processes. *Public involvement* asked if the public provides any feedback on performance measures by commenting on a government website, dashboard or at meetings. Since this study utilizes respondents' perceptions as a proxy for institutional characteristics, individual attributes that can bias responses are controlled. As discussed above, since there was some motivational bias presented in the sample data, personal attitude toward performance management was controlled, along with other personal characteristics, in analyses to address potential bias in addition to multiple imputations. The question asked how important a respondent perceives performance measurement to be for achieving his/her city's sustainability

goals. Also included was the hierarchical position of the respondent within the organization. Local governments' sustainability efforts depend on certain community characteristics, such as population, community affluence, and education levels (Betsill 2011; Krause 2011). The form of government was used to uncover potential dynamics depending on different forms of government. Particularly, the rationalizing force often assumed for council-manager governments with the presence of professional administrative officers may show a positive association with the purposeful use of information, while their counterparts may be related to the increased level of political use of information. The model also includes population and poverty rate of each city, as well as their government types, and was estimated with state fixed effects to account for any unobserved heterogeneity between states. Table 2-2 describes variables used in the analyses and table 2-3 reports summary statistics of each variable. Appendix 3 provides the survey questions used for each variable.

[Table 2-2 about here]

[Table 2-3 about here]

Results and Discussion

As noted above, the DV is a count variable. Under the assumption that the nature of the response categories is inherently ordered (the larger value indicating the wider scope of activities for which performance information is used), ordered logistic regression is employed. Implicit in ordered logistic models is a proportional odds assumption that treats the distance between each pair of categories the same (i.e. the smallest category vs. the next higher category; the next smallest category vs. the highest category), and thus it only produces one set of coefficients across different categories (Long and Freese 2006). For this reason, a Likelihood-Ratio (LR) test was employed to test if the current model violates this assumption. If violated, an alternative model to describe the different relationship between each pair of outcome

categories needs to be sought after. The test result shows a failure to reject the null ($P > \chi^2 = 0.17$), meeting the proportional odds assumption, thus obviating a need for an alternative model.

Ordered logistic regression results of both using multiply imputed data and CCA are presented in Table 2-4, side-by-side. For interpretation purposes, odds-ratios are reported. The results show some interesting patterns. Most notably, a majority of sociological factors, except employee engagement, show significant relationships with the increased level of performance information use. The likelihood of odd-ratio increase is greater particularly for leadership involvement; for cities where the top management is engaged in the selection and review of performance measurement indicators, the odds of using the information generated from the indicators are 2.6 times greater than cities that do not have such leadership involvement. This highlights the magnitude of the influence top management has on shaping institutional behaviors of public institutions. Public involvement in performance review processes is also found to be significant; when a city has the public actively involved in reviewing performance metrics through various platforms, including government website, dashboard, or offline meetings, the odds of using performance information for program improvements is 1.6 greater than when they do not such public participation. Empirical evidence for the positive effects of public involvement on public service delivery and management already has been well-established in other literatures (e.g. co-production). Yet, many still observe that performance management remains a technocratic management tradition and incorporating citizen participation in the processes is still an exception rather than the norm when it can have important implications on the performance of performance management systems (Chai 2009; Caddy and Vergez 2001). The significance of public involvement found in this study suggests that citizen participation can further nudge local governments to use their performance information, thereby resulting in evidence-based sustainability implementation and decision-making.

Given that the two are the main external stakeholders for local governments, the results once again confirm the importance of political support and legitimacy concerns underlying public organizations. For resource-restrained local governments, the support from stakeholders provides a critical base for acquiring financial resources to invest in necessary administrative infrastructure (e.g. staff and IT) to perform a task. But also, stakeholder support adds a legitimizing force for their actions. This particularly makes sense in the area of sustainability. As discussed above, sustainability is rarely a top priority for most local governments, and the role of external stakeholders in creating a performance-oriented culture can be particularly significant in sustaining and managing sustainability policy efforts; by signaling their interest in the performance system, stakeholders can reinforce the value of the system as well as the information the system generates. The significance of the performance-oriented culture also suggests that an organization that orients its culture around learning as well as achieving results could positively shape efforts to deliberately apply performance information to management.

[Table 2-4 about here]

On the other hand, for rational factors, only two are found as significantly shaping the likelihood that a city will use performance information for internal management: goal clarity and measurement system quality. To capture measurement system quality, this study employs two variables: the quality of metrics and the comprehensiveness of the measurement system. Metrics quality is positively and significantly associated with increased use. Given that metrics quality was assessed in four dimensions – measurability, validity, reliability, and practicability, – this suggests that what is likely to help employees use the collected information is the ease of using the measurement system and the quality of information it produces. On the other hand, no significant evidence is found for the hypothesis that the more often information is collected over a broader range of activities the more performance information is used. Together, these findings suggest that metrics that are accessible and produce information that is reliable, valid,

and relevant for management are more important than how extensively and frequently information gets collected.

Conclusion

After decades of frustration with the underperformance of performance management systems, research now points to the important role of information use in realizing the benefits and promises promoted under performance management doctrines. Significant research attention is now given to how to create an institutional context conducive to using data and making evidence-based decisions. This research contributes to this growing body of knowledge by examining how institutional factors shape U.S. local governments' efforts to manage sustainability performance. This research is particularly timely, as scholars in sustainability research increasingly criticize the lack of understanding of sustainability performance and calls for research attention to post-adoption phases.

This research employed two prominent frameworks of organizational behavior to categorize individual institutional drivers of performance information use: rational choice institutionalism that focuses on formal institutions, such as structure and capacity, and sociological institutionalism that broadly considers such soft attributes of an organization as culture and stakeholder involvement as guiding principles for organizational action. From the perspective of rational choice institutionalism, institutions that reduce costs involved in the process of routinizing performance information use are likely to further the process. This can be done by improving performance measurement systems that will improve the ease of use or providing resources to enhance organizational rationality for processing and analyzing information. On the other hand, for sociological institutionalism, what are likely to shape institutional behavior are value-reinforcing institutions, such as culture, norms, and belief systems that assign positive meanings to performance information use. Overall, this research

finds evidence for the latter perspective of sociological institutionalism. Local governments that display an increased level of performance information use in sustainability management are found to have a culture that communicates the values of learning, creativity and performance-oriented management. For these cities and towns, key stakeholders – the top management and the public – are also actively engaged in the process of selecting and refining performance metrics through various online and offline communication channels. This suggests that local governments interested in promoting data-driven sustainability management would be wise to work on communicating how such practice is valued and desired, whether through culture or/and stakeholder pressure, while also improving the quality of metrics and goal clarity to support them in the process.

As to the insignificance of institutional capacity, it is possible that neither capacity measure was objective and thus the perceptions of individuals failed to capture the construct properly. This is the limitation of this type of survey-based research and thus future research efforts should be made to complement the perceptual measures with objective ones. Nonetheless, support for the utility of perception-based data as an effective proxy for variables of interest is not sparse. Perceptual measures can be particularly informative in performance management research, given the political nature of performance information use that this study and many others find; because performance information use is greatly influenced by values and norms transmitted through culture, leadership support, and stakeholder pressure, any attempt to understand the process needs to incorporate perceptions and attitudes of the key users (Taylor 2007).

The potential of performance management, when properly implemented, has already been extensively stated and discussed in the literature. What is more needed is empirical evidence – both through narratives and modeling – for what influences the fuller realization of this potential; this research was an attempt to respond to this call.

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Tables

Table 2-1. Table of Hypotheses

Rational-Choice Approach	H1: Performance information use is more likely, when quality measures are present, represented through the degree of reliability, measurability, validity, and relevancy.
	H2: Performance information use is more likely, when information is collected more frequently and extensively across organizational activities and programs.
	H3: Performance information use is positively associated with the level of an institution's human capacity to manage and analyze data.
	H4: Performance information use is positively associated with the level of an institution's technological resources to manage and analyze data.
	H5: Performance information use is more likely when organizational members share a clear goal.
Sociological Approach	H6: Performance information use is more likely when an organization has cultivated a performance-oriented culture where learning is encouraged, and achievement of results is emphasized.
	H7: Performance information use is more likely when the leadership is engaged in performance measurement design and review processes.
	H8: Performance information use is more likely when the public is involved in performance measurement design and review processes.
	H9: Performance information use is more likely when the employees are involved in performance measurement design and review processes.

Table 2-2. Variable Description

Variable Name	Variable Description
<i>Dependent Variable</i>	
Performance Information Use	An additive index that shows the scope of activities for which a city uses performance information. Questions were asked on a binary scale (0,1) if performance information is used for: (1) setting a target; (2) making program improvements; (3) rewarding employees; and (4) communicating with other departments
<i>Independent Variables</i>	
<i>Capacity-Enhancing Institutional Factors</i>	
Metrics Quality	The degree to which performance measures display the following qualities on a scale of 1-10 across the three sustainability dimensions: measurability, reliability, validity, and relevancy.
Comprehensiveness of measurement system	The scope and frequency of data collection asked across 6 broad categories of activities (2 for each dimension of sustainability) on a scale of never (1) to several times a year (5).
Supporting Capacity (IT)	The extent to which a survey respondent perceives, on a scale of 1-10 his/her government has established sufficient level of IT infrastructure for data management and analysis.
Supporting Capacity (HR)	The extent to which a survey respondent perceives, on a scale of 1-10 his/her government has enough staff to perform data analytics.
Goal Clarity	The extent to which departments involved in sustainability have a shared goal of sustainability ranging from 1-10
<i>Value-Convincing Institutional Factors</i>	
Leadership Involvement	If the top management (political and administrative leaders) is engaged in measurement selection and review processes (0=No, 1=Yes)
Employee Involvement	If employees who are tasked with using the collected data are involved in measurement selection and review processes (0=No, 1=Yes).
Public Involvement	If the public provides feedback during measurement selection and review processes through performance dashboard, government website or public meetings (0=No, 1=Yes).
Performance-oriented Culture	Captured using a factor analysis of the following three variables measured on a scale of 1-10: the degree to which a respondent thinks if the top management 1) encourages learning from mistakes; 2) embraces openness to new ideas; and 3) shows a strong commitment to achieving results.
<i>Individual-level Controls</i>	
Hierarchical Position	The position of a respondent within the respondent's department (1= Team-member, 2=Middle-manager, 3=Top manager/supervisor)
Personal Attitude	The degree to which a respondent thinks it is important to collect data on the progress of sustainability programs to achieve his/her city/town's sustainability goals (0=Unimportant, 1=Neutral, 2=Important, 3=Very important)
<i>City-level Variables</i>	
Population	2010 population estimates for each city/town included in the study sample
Poverty Rate	2010 poverty rate for each city/town included in the study sample
Government Form	The form of government 1 for Council-Managed, 0 for otherwise.

* All but city level variables come from the author's survey data.

Table 2-3. Observed Data: Summary Statistics of Variables

	N	Mean	Std. Dev	Min	Max
Purposeful-use of Information	406	2.377	1.214	0	4
Measurement Comprehensiveness	425	3.237	.828	1	5
Metrics Quality	390	5.450	1.878	1	10
Leadership Involvement	431	1.281	.764	0	1
Performance-Oriented Culture	373	7.757	1.771	1.982	10.137
Public Engagement	431	.441	.497	0	1
Employee Engagement	431	.636	.482	0	1
Human Capacity	387	4.021	2.227	1	10
IT Capacity	389	4.728	2.398	1	10
Goal Clarity	395	5.808	2.466	1	10
Hierarchical Position	433	2.557	.682	1	3
Personal Attitude	435	3.315	.724	1	4
Population	441	91968.26	118200.4	20103	1187285
Poverty Rate	441	10.224	5.874	1.6	33.8
Government Form	441	.675	.468	0	1

Table 2-4. Ordered Logistic Regression Results

Independent Variables	MI Estimates	CCA Estimates
<i>Rational Factors</i>		
Measurement System Quality		
Comprehensiveness	1.230 (.177)	1.447 (.283)
Metrics Quality	1.245* (.106)	1.126 (.117)
Supporting Capacity		
Human capacity	.996 (.077)	1.093 (.101)
IT capacity	1.031 (.067)	1.021 (.078)
Goal Clarity	1.237** (.079)	1.235** (.099)
<i>Sociological Factors</i>		
Leadership Engagement	2.574** (.698)	3.186** (1.162)
Performance-oriented Culture	1.237** (.036)	1.424*** (.118)
Bottom-up Stakeholder Involvement		
Public engagement	1.577* (.318)	1.323 (.348)
Employee engagement	.966 (.216)	.754 (.221)
<i>Controls</i>		
Individual-level Controls		
Personal Attitude	1.068 (.168)	.966 (.201)
Position	1.056 (.167)	1.215 (.237)
City-level Controls		
Population	1.000 (.000)	1.000 (.000)
Poverty Rate	.997 (.019)	.995 (.029)
Form of Government	1.467† (.304)	1.587 (.393)
N	410	286
Average RVI	.093	-
Largest FMI	.174	-
Imputation	30	-
Pseudo R^2	-	20.2
LR χ^2 (df)	-	145.37(15)***

Notes: †p<.1; *p<.05; **p<.01; ***p<.001; standard errors are in parentheses.

Appendices

Appendix 1. Multiple Imputation Procedures

A careful inspection of the sample data revealed the presence of missing values. The missing values showed patterns of difference that are not statistically significant in key community characteristics (e.g. population, education, race) and institutional characteristics captured in the survey (e.g. leadership characteristics, capacity, system attributes), but only in one survey question that asked about respondents' assessment of the importance of performance information in sustainability implementation. Responses that have high missing values also show low scores on the question, indicating that respondents who skipped more questions tend to undervalue the role of performance information in achieving sustainability goals, compared with those who filled out all questions. This is an indication that the data is Missing at Random (MAR) where missing values are dependent on observed variables, thus the issue is further addressed through Multiple Imputation processes.

The percent of missing for variables included in the model ranges from 1.36 to 15.42. A general rule of thumb to consider correcting missing data is when observations are missing for a given variable at more than 10% (Bennett, 2001). Since the data employed in this research is MAR, missing values were imputed using Multiple Imputations using chained equations (MICE) to allow separate conditional distributions for each imputed variable, since both political and purposeful models have binary and count variables. To further improve the quality of imputed values, an auxiliary variable that is correlated with missing variables (recommended correlation >0.4) was identified and included in imputation process.

Because the quality of imputed values depends on the correct specification of imputation model, the results of MI were diagnosed by visually examining trace plots to check the convergence of the chain produced by imputations. Plots showed no observable trends and relatively stable predicted values, indicating a good convergence. Imputed values were also examined against observed values to see if they are within the reasonable range. Variance was assessed using Relative increases in variance (RVI) and fraction of missing information (FMI) metrics. If the proportion of missing is high and/or auxiliary variable is not suitable, high RVI and FMI will be observed (Sharth et al. 2018). For this research, average RVI was 0.09, indicating that the estimated sampling variance was 9% larger than what would have been had the data been complete. The largest FMI was 0.17 and, thus data was imputed 30 times, as research suggests the number of imputations to be higher than the largest FMI in order to appropriately account for the uncertainty of imputed values responses. Taken together, diagnostics indicated a reasonably good performance of modeling approach. Appendix 1 reports summary statistics of variables using multiply imputed data to provide a further comparison of key statistics between observed data and multiply imputed data.

Appendix 2. Multiply-imputed Data: Summary Statistics of Variables

	N	Mean	Std. Dev	Min	Max
Purposeful-use of Information	6,556	2.149	1.226	0	4
Measurement Comprehensiveness	6,155	3.155	.879	1	5
Metrics Quality	6,510	5.154	1.855	1	10
Leadership Involvement	6,641	.786	.410	0	1
Performance-Oriented Culture	6,155	15.478	3.628	4.2	21
Public Engagement	6,641	.383	.486	0	1
Employee Engagement	6,641	.560	.497	0	1
Human Capacity	6,387	3.813	2.257	1	10
IT Capacity	6,449	4.460	2.345	1	10
Goal Clarity	6,455	5.380	2.536	1	10
Hierarchical Position	6,613	2.557	.684	1	3
Personal Attitude	6,555	3.213	.786	1	4
Population	6,651	89410.91	125892.9	20103	1187285
Poverty Rate	6,651	10.233	6.054	1.6	33.8
Government Form	6,651	.698	.458	0	1

Appendix 3. Survey Items Used for Analysis

Purposeful-use of Information

Does your city/town use the collected data for the following activities? (No=0, Yes=1)

- Setting sustainability priorities/targets
- Improving existing programs
- Rewarding employees
- Communicating between departments involved in sustainability management

Comprehensiveness of Measurement System

To your best knowledge, how often does your city/town collect data on initiatives in each of the following domains? (Never=0; Every 6-10 years=1; Every 2-5 years=2; Every year=3; Several times a year=4)

- Energy conservation (e.g. renewable energy use, energy efficiency, green building etc.)
- Environmental Protection (e.g. open space preservation, recycling, water protection etc.)
- Local employment (e.g. empowerment zones, local business incubator programs etc.)
- Smart growth (e.g. infill & brownfield redevelopment, mixed-use development etc.)
- Social equity (e.g. affordable housing provision, neighborhood planning etc.)
- Community wellbeing (e.g. homeless intervention, youth opportunity & anti-gang program etc.)

Metrics Quality

On a scale of 1="Very Poor" to 5="Very Good," please rate the following statements about the metrics your city/town uses for assessing sustainability programs (the same questions were repeated for each of the 3 domains of sustainability).

- Metrics are relatively easy to measure
- Metrics are objective, requiring little subjective judgment.
- Metrics are linked to sustainability goals.
- Metrics produce information relevant for management practice.

Capacity

On a scale of 1="Not at All" to 10="Absolutely Agree," to what extent do you agree with the following statements about your city/town's efforts to manage sustainability programs? Unit's departments in my organization generally...

- Have sufficient staff members to perform data analysis
- Have adequate IT resources (e.g. integrated databases, analysis software etc.) to manage data

Goal Clarity

Units/departments in my organization generally share clear sustainability goals

Performance Oriented Culture

On a scale of 1="Not at All" to 10="Absolutely Agree," to what extent do you agree with the following statements about your city/town's efforts to manage sustainability programs? In general, senior managers in my organization...

- Encourages learning from mistakes
- Open to new ideas initiated by employees
- Shows a strong commitment to achieving results

Stakeholder Involvement

Which of the following actors provide feedback on how to evaluate the progress of sustainability programs (e.g. what to measure, how to measure etc.)?

- Top management (e.g. elected officials, city manager, chief financial officer)
- Employees who actually use the collected data
- Public (by commenting on performance dashboards, government websites or at meetings)

Personal Attitude

How important do you think it is to collect data on sustainability programs for achieving your city/town's sustainability goals? (Unimportant=1; Neutral=2; Important=3; Very Important=4)

Hierarchical Position

Which of the following best describes your position within your unit? (Team-manager=1; middle manager=2; Top manager/supervisor=3)

Chapter 3 Cross-departmental information sharing for sustainability performance management: Empirical evidence from U.S. local governments

Introduction

For the past two decades, we have observed a shifting paradigm from information protection to sharing in the public sector⁸. This has been shaped by both political and technical forces; tragic events, such as 9-11, have highlighted the gravity of information-sharing failure, while performance-driven regimes have instilled the value of information in public management (Hale 1996; Kim and Lee 2006; Yang and Maxwell 2011). The advancement of information technology and data science has also aided this process, as it has not only enabled greater information dissemination, but also increased a sense of social connectivity (Jarvenpaa and Staples 2001). In addition, public services and programs today are increasingly delivered through networks of multi-sector policy actors, for example, through contracting-out and joint-ventures with private and non-profit entities. Such governance structures necessitate close cross-department and agency coordination, which involves an exchange of information resources that used to reside within individual organizations. Thus, there is now a trend in both practice and research of promoting information-sharing as one of the most critical determinants of organizational performance (Kim and Lee 2006; Liebowitz and Beckman 1998; Yang and Maxwell 2011).

Prolific research now exists to shed light on the critical role information-sharing plays in managing public programs, most prevalently in the fields where up-to-date, shared

⁸ Ambiguity exists as to what information means or should mean; some scholars note that knowledge is, by definition, more inclusive than information, as it involves a certain level of subjective interpretation and internalization processes; others find little practical utility in distinguishing between the two concepts (Wang and Noe 2010). This research follows the latter approach.

information is critical for program performance, such as homeland security, disaster management, and information science. While substantial research has been conducted on information exchange in interagency contexts, research also observes that it is equally important and challenging to integrate information even within a single organization. An institutionalized practice of intra-organizational information-sharing can deliver several benefits, such as streamlining processes, reducing duplications and work errors, and improving social-emotional outcomes of organizational members (Jarvenpaa and Staples 2001; Willem and Buelens 2007). Despite these expected benefits, however, research finds that in most cases information resources are still diffused across the boundaries of individual departments, thus requiring concerted efforts to integrate them. There are several reasons for this, such as sensitivity to disclosing performance information and impediments rising from different processes, rules, and norms embedded in individual units. Therefore, major efforts are now underway to understand how an organizational context or environment can be designed to ease these challenges and enable individuals to share information for building organization-wide collective knowledge (Chen and Hsieh 2015; Cress, Kimmerle, and Hesse 2006; Jian and Jeffres 2006; Weber and Khademian 2008; Willem and Buelens 2007; Zhang, Dawes, and Sarkis 2005).

This study joins these scholarly efforts in investigating the drivers of intra-organizational information sharing. To do so, it utilizes one important, yet under-explored study context: sustainability performance management among U.S. local governments. The broad nature of sustainability goals encompassing environmental, social, and economic well-being inherently necessitates multiple departments' collaboration on integrating key informational resources. And such needs for information sharing arise not only for successful policy implementation but continue through the stages of measuring and managing program performance. This is because the quality of performance management systems rests on the rich

and continuous inflows of information about organizational activities across different functions and divisions. Yet, little is known about information sharing dynamics for managing program performance, and even less for sustainability performance of the public sector. Thus, this chapter investigates inter-departmental information sharing behavior within local governments' sustainability performance management and relevant organizational factors that enable such behavior. By doing so, this chapter not only will enhance the understanding of organization-wide information integration, but also offer a new perspective on the current debate as to performance measurement. Abundant research exists to inform us how to effectively measure program performance, yet these discussions rarely consider the behavioral aspects of performance measurement. This study argues that effective performance measurement not only involves the technicality of developing quality metrics, but also necessitates institution-wide behavioral change among individual departments to systematically disclose and contribute the collected information to the performance system. Therefore, this chapter aims to expand the discourses on performance measurement to consideration of the challenges associated with integrating performance information across personal and functional boundaries.

This research proceeds as follows: First, it briefly describes the increasing need for information sharing in the public sector and its expected benefits for organizational performance. It then discusses how information sharing remains an exception rather than the norm among many public organizations, despite the several claimed benefits. Challenges and major institutional conditions that research finds enable organizations to overcome these challenges are identified. Based on these discussions, hypotheses are developed and tested. This chapter also pays close attention to potential endogeneity problems and employs Structural Equation Modeling (SEM) to address them. Results are discussed, and graphics are

presented to help interpret the results, followed by policy implications and suggestions for future research.

Literature Review

Public Sector Performance and Information Sharing

With ever more complicated policy issues requiring cross-boundary coordination and the development of technology, research increasingly finds that information sharing is among the most critical factors that determine organizational performance (Kim and Lee 2006; Yang and Maxwell 2011). Public organizations are also establishing IT infrastructure to share information and knowledge within and across organizations. (Willem and Buelens 2007; Zhang, Dawes, and Sarkis 2005; Kim and Lee 2006). The benefits of intra-organizational information-sharing can manifest in several ways, including integrating and disseminating organizational knowledge, improving communication and coordination among organizational members, and removing duplicate processes and activities. It can also generate long-term benefits relating to human and social capital management. When information sharing occurs through in-person contacts, it has the potential to create a positive climate where a sense of cohesion and reciprocity is cultivated through repeated interactions which, in turn, improves social-emotional outcomes and, ultimately, organizational performance (Mesmer-Magnus and DeChurch 2009). While such social-capital benefits are likely to be most obvious in cases of direct interaction, exchanging information through overt channels, such as integrated platforms, is still expected to positively influence organizational performance by fostering a transparent organizational culture (Mesmer-Magnus and DeChurch 2009).

While several explanations are offered as to how information sharing enhances organizational performance, one major avenue is through its contribution to organizational learning. Organizational learning refers to an organization's ability to develop, disseminate,

and apply knowledge, information, and evidence to program management and evaluation (Moynihan and Landuyt 2009). Organizational learning is the key concept underpinning several major, modern public management reforms, such as total quality management, performance budgeting and evidence-based program management (Barrados and Mayne 2003; Moynihan and Landuyt 2009; Richards and Duxbury 2015). It is expected that when information and knowledge cross over individual and departmental boundaries, they provide a critical base for a broader knowledge network through which an organization can collectively learn and innovate and, thus, improve its performance (Henttonen, Kianto, and Ritala 2016; Kim and Lee 2006; Richards and Duxbury 2015; Silvi and Cuganesan 2006).

The needs for organizational learning through information sharing are particularly significant for the public sector whose performance is closely tied to the degree to which it can develop and manage collective knowledge. Public organizations are “knowledge-intensive” organizations (Luen and Al-Hawamdeh 2001; Henttonen, Kianto, and Ritala 2016; Huang 2014). All public organizations carry out knowledge-based activities, to varying degrees, either by directly offering knowledge to key stakeholders, including elected officials and the public, or indirectly providing programs and services to the public devised by knowledge workers, e.g. policy analysts (Willem and Buelens 2007). Therefore, public sector performance is now linked to the degree to which an organization can systematically integrate informational and experiential resources held by individuals or individual departments across personal and structural boundaries (Moynihan and Landuyt 2009).

Performance Measurement as Behavioral Change

Despite the close link between information sharing and organizational performance, however, information sharing is rarely considered as an important variable in performance management literature. Most research on public sector performance management is concerned

with how to measure performance and use the measured performance information.(e.g. de Lancer Julnes and Holzer 2001; Ho 2005; Melkers and Willoughby 2005; Moynihan 2008). Rarely do scholars discuss the processes of collection, which involve the disclosing and sharing of information between departments and individuals. Instead, in the literature collection is often equated with measurement, hence its discussion tends to fall within the realm of technical issues, such as the validity and reliability of metrics and the ease of information system use (e.g. Adams, Muir, and Hoque 2014; Domingues et al. 2015; Williams, Wilmshurst, and Clift 2011).

The collection of data and information, however, involves processes that are not merely technical, but also behavioral and psychological. It entails the task of creating a collaborative culture where departments contribute their inputs, e.g. performance records, to the system and communicate with a wider community. This can be challenging given the current emphasis on performance-driven management in the public sector, which may cause a heightened level of sensitivity and resistance to disclosing performance information, especially when not mandated. Sustainability is a good example. Research notes that the mandated requirements for performance reporting on sustainability programs tend to be minimal and underdeveloped in the public sector, often requiring voluntary and motivational factors to sustain the practice (Chai 2009; Volkery et al. 2006). Such reliance on motivation is less likely to provide steady and effective efforts in systematically bringing departments to exchange information. The following comment from a mid-western city administrator, involved in sustainability performance management, reflects this concern:

“Departments are supposed to share their data with each other as part of open government policy. But they don’t always, and many departments drag their feet... and there are legitimate reasons for that. Privacy concerns, databases and servers that are not set up for sharing.” (personal interview, 2017)

Performance measurement inherently involves challenges associated with managing people. Research explains the “people factor” – changing their behavior – is the number one difficulty in information sharing, as it is a natural human tendency to feel guarded about personally-held information (Bock et al. 2005; Davenport, Eccles, and Prusak 1998; Jarvenpaa and Staples 2000). This is largely because information is often endowed with power and influence (Kolekofski Jr and Heminger 2003; Marks et al. 2008; Yang and Maxwell 2011). This is true for any organization, but particularly so for public agents who have been described as drawing their power or legitimacy from information and expertise they hold. From the view of the politics-administration dichotomy and principal-agent theory, which dominated much of public administration’s intellectual history, political legitimacy is narrowly defined by conceptualizing the election as the “sine qua non of representation.” (Long 1952) This scholarship argues that bureaucrats, lacking electoral representation, should be limited to the role of implementation and cautions against their discretion in policy-making. Bureaucrats holding expertise and information – often more than their principals – and the consequent information asymmetry, become a major concern, for the possibility that their discretionary decisions may deviate from the popular will (i.e. the will of their political principals representing the public) (Balla 1998; McCubbins, Noll, and Weingast 1987; (Watkins-Hayes 2011; Whitford 2002). In this view, information constitutes an important source of power for public agents and sharing information can cause the fear of losing or diminishing that power.

Motivation for sharing information to improve organizational performance is also not clear for many public institutions. Public administration research has long noted that efficiency is not necessarily the top priority for public sector organizations, compared to their counterparts in the private sector. Reputation and legitimacy are just as important concerns– if not moreso – as efficiency or other market values for defining performance (Carpenter and Krause 2012; Frumkin and Galaskiewicz 2004; Powell and DiMaggio 2012). In these circumstances, the

rationale for information sharing on the grounds of performance improvement may not provide sufficient impetus or motivation for public agents. Thus, the problem of information hoarding can be particularly prevalent and persistent among public organizations and information-sharing remains an ambitious goal (Chen and Hsieh 2015; Wang and Noe 2010; Yang and Maxwell 2011).

Hypotheses

Drivers of Information Sharing

Challenges are inherent in integrating information in the public-sector and deliberate efforts are required to change people's perceptions toward information sharing. Extant research identifies multiple ways to institutionalize conditions that may help further this change (Grover and Davenport 2001; Willem and Buelens 2007). By taking advantage of the key insights developed within this literature, I aim to investigate institutional conditions under which intra-organizational information sharing may increase when managing sustainability performance.

First, *organizational culture* that emphasizes affiliation, mutuality and collaboration is an important consideration for promoting information sharing. According to research, an organizational culture that emphasizes inter-dependence and affiliation can regulate information-sharing behavior by diminishing the sense of ownership of information – a major impediment to information sharing – and encouraging individuals to perceive sharing as a norm, rather than an exception (Bock et al. 2005; Jian and Jeffres 2006; Tsai 2001). Organizational behavior and institutional theories have long observed that people are often not rational; rather, their actions are often shaped by the norms and values infused through surrounding social climates and contexts. In this sense, culture can be a powerful tool to governing institutional behavior, as actors are interested in making judgments that are not only deemed efficient or effective, but also legitimate and socially fit (Powell and DiMaggio 2012; Frumkin and

Galaskiewicz 2004). Jarvenpaa and Staples (2000) explain that communicating the value of collective action within an organization can encourage employees to “rise above their self-interest rational impulses to consider the long-term impacts of their actions.” Based on these discussions, the following hypothesis is developed:

H1: The level of interdepartmental information-sharing in sustainability performance management is related to the degree to which an organization emphasizes such values as affiliation and collaboration among employees.

If culture underscores the relational aspects of information sharing, formal *incentives* can increase information-sharing by tapping into individual’s rational self-interest. Research notes that formal incentives can provide an important motivation when individual contributions to creating an organizational-wide collective knowledge are compensated through monetary and/or non-monetary measures, such as recognition (Jian and Jeffres 2006; Willem and Buelens 2007). It is also important to provide incentives specifically tailored for the desired behaviors. Some argue extrinsic rewards have only limited and sometimes perverse effects on individuals’ attitudes. For example, while some find general performance-based rewards facilitate information sharing, many argue such general incentive systems instead incite competition and make individuals reluctant to share information or, at best, increase ad-hoc sharing that is less likely to help with internalizing the culture of information sharing (Barua, Ravindran, and Whinston 2007; Zhang, Dawes, and Sarkis 2005). Based on these discussions, the following hypothesis is developed:

H2: The level of interdepartmental information-sharing in sustainability performance management is related to the types of incentives available in an organization.

Specifically, incentives specifically tailored for information-sharing are expected to have positive effects while general performance-based rewards have negative effects.

Several features of Weberian *bureaucratic structure* are also known to be at odds with information-sharing. Departmentalized and hierarchical structures, which were initially designed to define clear lines of responsibility and increase work efficiency, tend to create barriers to interaction. For example, centralized authority that limits work autonomy and lateral communication channels, can hamper inter-departmental engagement (Kim and Lee 2006; Tsai 2001). Formalization that lowers flexibility can also interfere with sharing of information (Jarvenpaa and Staples 2001; Kim and Lee 2006; Willem and Buelens 2007). When departments have different rules and processes that their employees need to follow strictly, this can reinforce functional and structural boundaries that already exist between departments (Feiock, Krause, and Hawkins 2017). Many argue that, within bureaucratic models, information flows are hindered by the structure that emphasizes functional divisions and the culture of hierarchy, making it difficult to develop collective knowledge and integrated solutions to problems (Cress, Kimmerle, and Hesse 2006). It is important to understand if and how public agencies can encourage functionally-fragmented units to share performance information both within and across organizations. Therefore, it is hypothesized that:

H3: The level of interdepartmental information-sharing in sustainability performance management is related to the level of organizational bureaucratization, characterized by formal and vertical structures.

Institutional *capacity*, particularly relating to information management, is also an important condition in enabling information sharing to occur. The rapid development of Information Technology (IT) was one major driving force behind the movement toward information and knowledge integration. Therefore, it is important to consider the extent to which organizations have capacity, such as IT infrastructure and human resources to collect

quality information, as well as analyze and disseminate it (Alavi and Leidner 2001; Kim and Lee 2006). This study analyzes information sharing in a specific context (i.e. performance management) and the importance of IT infrastructure highlighted in information sharing literature, thus accounting for another vital component of institutional capacity: the quality of a performance measurement system. If the system underperforms, producing unreliable and largely irrelevant information for management, departments are unlikely either to contribute to the system or to use the information collected from the system to further develop collective knowledge of their organization's current performance. Therefore, IT capacity that is both general and specific to performance management, as well as human capacity to manage the data, is likely to have important implications on the level of information sharing. Therefore, it is hypothesized that:

H4: The level of interdepartmental information-sharing in sustainability performance management is related to the level of organizational capacity, specifically relating to human and technological resources.

Based on these discussions, this chapter empirically examines which of these organizational factors shapes the likelihood that city departments will engage in information sharing when managing the performance of their sustainability initiatives. The following describes data and methodology.

Data and Model

Data

Data comes from an original survey that was conducted from October 2018 to early January 2019. The survey was sent to local governments in cities and towns with populations over 20,000. A staff member primarily in charge of sustainability program management was

identified through multiple rounds of web-search and in collaboration with the Urban Sustainability Directors Network (USDN). For a small portion of the sample (75 contacts), delivery of the survey failed despite multiple attempts. Excluding these, a total of 443 complete responses were received, a response rate of 37%. Although a higher response rate is ideal, such a response rate is common for this type of research. Among the responses collected through USDN, two cities had populations under 20,000 and, thus, were excluded.

The key objective of this research is to identify institutional conditions that explain why some U.S. local governments share information about sustainability performance management, while others do not. Four institutional conditions of primary interest are affiliative culture, bureaucratization, incentive system, and capacity. Here, special attention is required to potential endogeneity problems. Endogeneity is a fundamental problem to social science research where many variables studied are interdependent with each other (e.g. education and income, crime rates and poverty) and can cause serious concerns about the validity and reliability of research findings (Bollen and Noble 2011). Endogeneity may arise from several sources, such as selection bias, variable omission, simultaneous determination and many more. In this study, it is likely to come from the existence of multiple equations. In a standard regression model, a single equation exists where a Dependent Variable (DV) is explained by a linear combination of Individual Variables (IVs) and their covariates. On the other hand, where multiple equations exist, the standard terms of IV and DV are less helpful in understanding the model because the DV in one equation might be an IV in another equation (Bollen and Noble 2011). This can be written as the following:

$$y_1 = \alpha_1 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon_1 \quad (1)$$

$$y_2 = \alpha_2 + y_1 + \beta_3 x_1 + \beta_4 x_2 + \varepsilon_2 \quad (2)$$

where y_1 is an endogenous variable that is explained by x_1 and x_2 in equation (1) as well as an exogenous variable explaining y_2 along with other others in equation (2). In these cases, error terms of each equation are correlated with one another, causing endogeneity problems and needing a special statistical methodology to address them.

This study potentially faces the same problem; while affiliative culture is treated as an independent variable (IV) here, it is treated as a dependent variable in many other studies. This is because culture is not a standalone phenomenon, independent of institutional structure and mechanisms, but a manifestation of a complex interplay among people, structure, and mechanisms. In this study, one can reasonably expect that some of the factors research identifies as influencing information-sharing behaviors are also related to affiliative culture. Lateral communication structure, flexibility, and the provision of different types of incentives all create an institutional context conducive to information-sharing, but they are also desirable conditions for creating an affiliative and collaborative culture. Given that this research employs survey data, respondents' perceptions on the level of their leadership's support for collaborative culture can also be shaped by the way communication occurs in their organization, as well as specific incentives established for collaborative behaviors. Therefore, several institutional factors theorized in this study as related to information sharing behavior are also expected to have significant relationships with culture.

Methodology

To address this issue, I employ Structural Equation Modeling (SEM). SEM is marked by multiple equations and accounts for correlations between the endogenous variable equation and the outcome equation (Bollen and Nobel 2011; Christ et al. 2014). It is also more efficient than standard regression estimation, as it evaluates the relationships within and between equations simultaneously rather than separately or sequentially (Christ et al. 2014). SEM is

also methodologically preferable to other types of regressions when modeling latent constructs. I operationalize culture and information-sharing behavior as latent variables, as they are broad, abstract concepts that cannot be directly observed, as opposed to structures or systems, such as the availability of incentives and the presence of formal rules and agreements. When capturing such abstract concepts, multiple questions are necessary. The use of a single item is employed in some studies (e.g. multivariate regression analysis that models multiple outcome variables), but this approach neither effectively embodies a construct nor controls for measurement errors arising from using a single item. Factor score regression is an alternative but, while it better captures a construct, it also likely introduces bias. Plugging factor scores into an equation is commonly done yet highly debated as it treats factor scores as exogenous without proper attention to measurement error and uncertainty inherent in factor scores, resulting in biased estimates (Hoshino and Bentler 2011). This is particularly so when a factor is employed for dependent variable, which is the case of this study. SEM serves similar purposes yet is a more powerful alternative to multivariate regressions with latent variables, as it takes into account various issues that can arise from fitting multiple latent variables, such as interactions, nonlinearity and measurement error.

Within SEM, several variants exist. I employ Multiple-Indicator-Multiple-Cause (MIMIC). Unlike most SEM approaches, MIMIC-SEM allows simultaneous estimation of both formative and reflective constructs. In the former (formative), indicators cause the construct, while in the latter (reflective), indicators are explained by a latent construct as in conventional factor analysis. While the primary purpose of SEM is to measure reflective (latent) constructs and estimate the relationship between them, MIMIC integrates both formative and reflective models, thereby allowing one to understand the causes and consequences of a latent construct. This study theorizes that formative indicators are related to more than one construct (culture

and information sharing), and thus MIMIC-SEM is useful in that regard. This point will be elaborated graphically in the next section.

Model

This study employs two latent variables and 8 manifest variables. *Information sharing* is a dependent variable constructed from multiple survey questions. It is operationalized using the following five survey items: Departments involved in sustainability performance management 1) often interact with each other to exchange information on programs relating to sustainability; 2) regularly use inter-departmental meetings to discuss performance data; 3) are willing to share data; 4) help each other with acquiring necessary data on sustainability programs; and 5) can easily access information relating to sustainability programs. Cronbach's alpha coefficient is .88. Again, rather than constructing a simple index, I used SEM to better capture the latent construct underpinning information sharing behavior or the degree to which departments involved in sustainability policy implementation exchange information on sustainability activities and programs and data for performance management purposes

A total of 9 independent variables are employed to represent the four institutional conditions: affiliative culture, incentives, capacity, and the degree of bureaucratization. First, *affiliative culture* is another latent construct to represent to what degree an organization instills its employees with such values as collaboration and affiliation. It was captured using three questions that asked about the extent to which the respondent city's top management 1) emphasizes collaboration as an organizational objective; 2) encourages teamwork among staff; and 3) facilitates vertical collaboration by welcoming ideas initiated by employees (Cronbach's alpha=.86). Capacity has the following three individual variables: *IT capacity* reflects the extent to which a respondent perceives his/her organization to have a sufficient level of technological resources (e.g. integrated database) to manage data, while *human capacity*

represents the same for human resources. *Measurement System quality* is an additive index of four questions that reflect the extent to which a performance measurement system displays key qualities the extant literature identifies as constituting a well-developed performance measurement, such as accessibility, reliability, validity, and managerial relevancy (Cronbach's $\alpha=.93$). The degree of bureaucratization was captured using two questions: 1) *communication structure* – if communication tends to occur vertically through department heads or laterally among employees– and; 2) the degree of *discretion* departments enjoy in policy implementation rather than having to follow written procedures and rules. Lastly, incentive system consists of two questions: one asked if a respondent's organization offers formal incentives specifically for information sharing (e.g. rewards or recognition in annual evaluation) – named *specific incentive* – the other indicating *general rewards* for performance improvement. All questions, except the last two binary variables, were measured on a 10-point scale. In addition, survey respondents' personal attitudes toward performance management – how important a respondent considers performance measurement for achieving the city's sustainability goal – was controlled to prevent potential bias arising from different motivational levels. Table 3-1 describes the variables used in this chapter and Table 3-2 provides summary statistics of each variable. Detailed survey questions can be found in appendix 1.

[Table 3-1 here]

[Table 3-2 here]

Results and Discussion

Figure 3-1 visually presents the model⁹. The model shows two latent constructs – information sharing and affiliative culture – while the rest of the variables are manifest

⁹ Covariance arrows between observed variables and a control variable are not graphed in Figure 1 to improve readability.

(observed). To estimate the structural relationships between key constructs, it is important to ensure the constructs are valid and reliable. Convergent validity is assessed through examining individual standardized factor loadings, as well as obtaining the values of average variance extracted measures (AVE). A minimum of .5, and preferably .7 is suggested for factor loadings and a minimum of .5 for AVE, whereas for construct reliability test, .7 is recommended as a cut-off criterion (Hair et al., 2006). Table 3-3 presents standardized factor loadings (λ) that show how each latent construct is measured by 8 observed indicators along with fit indices at the bottom. Both standardized factor loadings and AVE estimates satisfy the guidelines (.70-.84 for factor loadings and .60-.68, for AVE), and all t-statistics for the loadings are statistically significant at .001 level. Construct reliability estimates are also well above the suggested cut-off point, with .87 for the information-sharing construct and .88 for the affiliative culture construct. Strong evidence is found for both the validity and reliability of each construct.

[Table 3-3 here]

[Figure 3-1 here]

Moving on to the structural component, the model presents information-sharing and affiliative culture as both formative and reflective, where arrows are drawn simultaneously from exogenous observed indicators to the latent variables and from the latent variables to observed indicators. While the former (formative) brings causal assumptions between the exogenous variables and the latent variables, the latter (reflective) captures each underlying construct. All but capacity variables are related to culture, as each of them is theoretically relevant for shaping affiliative culture that emphasizes collaboration; e.g. formal incentives for information sharing are also likely to support collaborative culture, while the opposite relationship is expected with rigidity, hierarchical communication structure and performance rewards.

The bottom of figure 3-1 shows fit indices. Model Chi-Square statistic is a traditional measure for evaluating overall fit of a structural model and insignificance indicates a good model. Chi-Square for the model is highly insignificant. Other fit indices also yield strong evidence for a good model fit, all exceeding recommended cut-off points: RMSEA=.01 (good fit < .08); RMSEA CI = .00-.03 (good fit =.03-.08); SRMR = .05 < (good fit < .08); CFI = .99 (good fit > .90); and TLI = .99 (good fit > .95).¹⁰ Taken together, these indicate the theorized model effectively explains the variations of observed data. In other words, hypothesized relationships among variables closely match patterns observed in actual data, yielding strong evidence for the model.

Results show some interesting patterns. While several variables exert direct influence on information sharing, a non-trivial number of variables are also interrelated with affiliative culture. To enhance readability, figure 3-2 rearranges the graphic with solid lines representing significant paths and dashed lines showing insignificant paths. From figure 3-2, several features of institutional context are important for understanding the variations in information-sharing behaviors of local governments. First, different types of incentives an organization offers show interesting dynamics, as each forms a significant path to information-sharing in opposite ways. Consistent with extant research, results indicate information-sharing is more likely when such behaviors are recognized through formal incentives. However, it is less likely when general rewards for performance are in place. This supports the claims that rewards targeting general performance improvement bring about heightened competition among staff and encourage them to hoard information for personal benefits (Barua, Ravindran, and Whinston 2007; Zhang, Dawes, and Sarkis 2005).

¹⁰ Abbreviations: Root Mean Square Error of Approximation (RMSEA); Standardized Root Mean Square Residual (SRMR); Comparative Fit Index (CFI); Tucker-Lewis Index (TLI).

On the other hand, formal incentives and performance rewards are linked not only to information sharing, but also to affiliative culture. Interestingly, performance rewards variable is positively linked to affiliative culture, raising some interesting points for discussion. The positive path between performance rewards and affiliative culture indicates the sample organizations that offer performance rewards also tend to emphasize collaboration. It could be that local governments' discourses on collaboration are situated within or parallel with the discourses on organizational performance, whereby collaboration is emphasized for performance improvement. Indeed, this is highly likely, given the multiple public-sector reforms that emerged in the modern era. This has likely driven public institutions to develop culture that simultaneously emphasizes multiple concepts, such as performance, collaboration, learning, and innovation, and this may have some contradicting effects on their organizational behavior. In this context, the contrasting relationships that performance rewards form with affiliative culture and information-sharing (positive for the former and negative for the latter) may explain why culture is insignificant; a mix of collaborative culture and the provision of performance incentives could send a mixed message, negating the positive role collaborative culture can play for facilitating information-sharing.

[Figure 3-2 here]

Capacity variables also show some interesting dynamics. While the quality of measurement system shows strong significance, both statistically and economically, general IT infrastructure remains insignificant. Instead, human capacity to manage data is found to be positively linked to the increased level of information sharing. This suggests that information-sharing is more likely in organizations where better performance metrics are available and sufficient staff members to carry out data analyses are present. The view on major features of bureaucracy as interfering with information-sharing efforts is supported partly with the mixed findings. While having work discretion rather than having to rigidly follow formal rules and

procedures is found to be important, hierarchical communication structure remains largely irrelevant for explaining information-sharing across models, although it has an expected sign. Hierarchical communication, however, forms a significant and negative relationship with affiliative culture, indicating that vertical communication structure (e.g. primarily through department heads) likely is not helpful in creating culture that communicates the values of affiliation and information-sharing.

In all, results indicate that institutional support is critical in promoting information-sharing in sustainability performance management. Simply communicating the values of sharing without proper supporting mechanisms is not likely to be effective. Incentives for sharing and system quality, in particular, display substantially large standardized coefficients when compared with other institutional variables. In other words, information-sharing is most likely when there are such targeted efforts as recognizing sharing behaviors and establishing quality metrics that produce reliable, valid, and practically relevant information. The strong evidence for their economic and statistical significance emphasizes the importance of a proper support system directly tied to information collection and dissemination. On the other hand, the results also highlight the importance of soft aspects of management for shaping institutional behavior. The fact that departments in the study sample respond differently to incentive types as well as the flexibility granted to them indicates the importance of the people factor, as suggested by other research. Establishing proper technical infrastructure alone does not automatically lead to sharing, unless people perceive sharing as a desirable and legitimate action— either rationally or socially (Jarvenpaa and Staples 2000; Orlikowski 1993).

Conclusion

The performance implications of information-sharing are discussed across multiple disciplines, including business management and information science, and a few subfields of

public administration, such as knowledge-management and e-governance. Important discussions and key insights from this scholarship can shed important light on the discussion of what constitutes effective organizational performance. Taking advantage of this opportunity, this research examined the institutional dynamics of information-sharing in local sustainability performance management. Understanding what explains effective information sharing within performance management is important, as effective use of performance management systems is conditioned on timely access to detailed, accurate data.

Investigation of U.S. city and town governments' engagement in information-sharing for sustainability performance management reveals some interesting relationships that exist not only between key institutional variables and information sharing but also among institutional variables themselves. In all, results highlight that supporting institutional mechanisms directly tied to information-sharing, such as incentives and a quality system to generate information, is important for understanding how city departments engage in collective knowledge building for performance improvement. A flexible structure that permits work autonomy in program implementation is also significantly linked to an increased level of information-sharing, while performance rewards are less likely to be helpful in that regard. On the other hand, the non-significance of culture and its positive relationship with performance rewards variable proposes an opportunity for future research. Culture is often found to be critical in shaping organizational behavior and bringing about desirable changes. It has received significance research attention, as evident in various terms designed to tap into different dimensions of culture, such as affiliative, result-driven, developmental and innovative culture. The multidimensionality of culture and the potential interrelationships among the dimensions, as discussed in the previous section, raise challenges in deconstructing it and operationalizing its dimensions. It also raises a question about the utility of examining one dimension of organizational culture in isolation of other dimensions. These questions remain open for future research.

This research contributes to current performance and information-sharing research by integrating the two literatures. It also advances the understanding of an institutional approach to information-sharing, yet its focus on institutional analysis also has limitations. Research explains that information-sharing is shaped by factors of three layers: structure and institutional context (the outer layer) that shapes inter-personal dynamics (the middle layer), which in turn affects individual belief systems (the inner layer) (Yang and Maxwell 2011). Since modeling a full set of relevant variables is not viable, this research examined the factors of the outer layer that broadly impacts all other factors. Nonetheless, individual level variables, such as information ownership, can be important and should be considered for future analysis, since whether to exchange information or not is, at the end, a personal, individual decision.

With the rise of the governance era and consequent needs for effective cross-boundary coordination, the needs for sharing-information and integrating knowledge are growing rapidly. Research efforts are under way to meet these needs and this chapter extends these efforts to advance our understanding about ways to create an integrated knowledge base for better-performing public institutions.

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Tables and Figures

Table 3-1. Variable Description

Variable Name	Variable Description
<i>Dependent Variable</i>	
Information Sharing	A latent construct that captures the degree to which departments involved in sustainability policy implementation exchange information on sustainability activities and programs and data for performance management purposes. It was constructed using five questions that asked about the extent to which departments 1) often interact with each other to exchange information on programs relating to sustainability; 2) regularly use inter-departmental meetings to discuss performance data; 3) are willing to share data; 4) help each other with acquiring necessary data on sustainability programs; and 5) can easily access information relating to sustainability programs. All measured on a scale of 1-10
<i>Independent Variables</i>	
<i>Latent Variables</i>	
Affiliative Culture	A latent construct that reflects how collaboration is valued and emphasized in an organization. Three questions that asked, on a scale of 1-10, about the extent to which the top management of a respondent's organization emphasizes collaboration as an organizational objective, encourages teamwork among staff and are open to new ideas initiative by employees.
<i>Manifest Variables</i>	
Measurement System Quality	A latent construct that reflects the extent to which a performance measurement system displays key qualities that extant literature identifies as constituting a well-developed performance measurement. Respondents were asked to rate, on a scale of 1-10, if performance metrics are 1) objective, requiring little subjective judgment and personal interpretation; 2) linked to sustainability goals; 3) not too difficult to use; and 4) produce information relevant for management.
IT and HR Capacity	Two additional variables to represent the construct, institutional capacity. Two questions asked the extent to which a respondent perceives, on a scale of 1-10, his/her organization to have sufficient level of human and technological resources (e.g. integrated database) to analyze and manage data.
Communication Structure	One of two variables that capture bureaucratization. A question was asked to what extent departments communicate through the department heads for sustainability program management, on a scale of 1-10.
Work Discretion (Rigidity)	Another variable to capture bureaucratization. A question was asked to what extent departments enjoy discretion for sustainability program management rather than having to follow formal rules and written procedures.
Incentive for Information Sharing	A binary variable indicating if formal incentives to share data (e.g. recognition in a formal evaluation or rewards) are available (0=No, 1=Yes).
Incentives for Performance	A binary variable indicating if rewards are provided based on work performance (0=No, 1=Yes).
Personal Attitude	A control variable that indicates the degree to which a respondent thinks it is important to collect data on the progress of sustainability programs to achieve his/her city/town's sustainability goals (0=Unimportant, 1=Neutral, 2=Important, 3=Very important).

Table 3-2. Variable Summary Statistics

	N	Mean	Std Dev	Min	Max
<i>Information Sharing</i>					
Help obtain information	394	6.068	2.314	1	10
Willing to share data	386	7.383	2.198	1	10
Have meetings to discuss data	365	4.967	2.498	1	10
Often interact to exchange info	378	5.753	2.403	1	10
Can access data easily	366	5.038	2.394	1	10
<i>Affiliative Culture</i>					
Emphasizes teamwork	421	8.009	1.948	1	10
Open to bottom-up ideas	424	7.5	1.979	1	10
Collaboration as an org goal	411	7.817	2.077	1	10
<i>Incentive System</i>					
Specific incentives	346	.263	.440	0	1
General performance rewards	409	.207	.406	0	1
<i>Capacity</i>					
Measurement system quality	390	5.456	1.882	1	10
Human capacity	387	4.020	2.226	1	10
IT capacity	389	4.727	2.397	1	10
<i>Bureaucratization</i>					
Hierarchical communication	395	6.091	2.225	1	10
Work discretion	385	5.584	2.130	1	10
<i>Individual Attitude</i>	435	3.335	.670	1	4

Table 3-3. Standardized Loadings of Latent Variables

Indicators	Information Sharing	Affiliative Culture
City/town departments involved in implementing sustainability programs...		
Help each other with acquiring necessary data on sustainability programs	.82	
Often interact with each other to exchange information on sustainability programs	.76	
Regularly use inter-departmental meetings to discuss data	.76	
Are willing to share data	.70	
Can easily access information relating to sustainability programs	.81	
The top management in my organization...		
Encourage teamwork among staff		.83
Are open to new ideas initiated by employees		.81
Emphasize cooperation as an organizational objective members		.84
Composite Reliability (CR) (>.7)	.88	.87
Average Variance Extracted (AVE) (>.5)	.60	.68

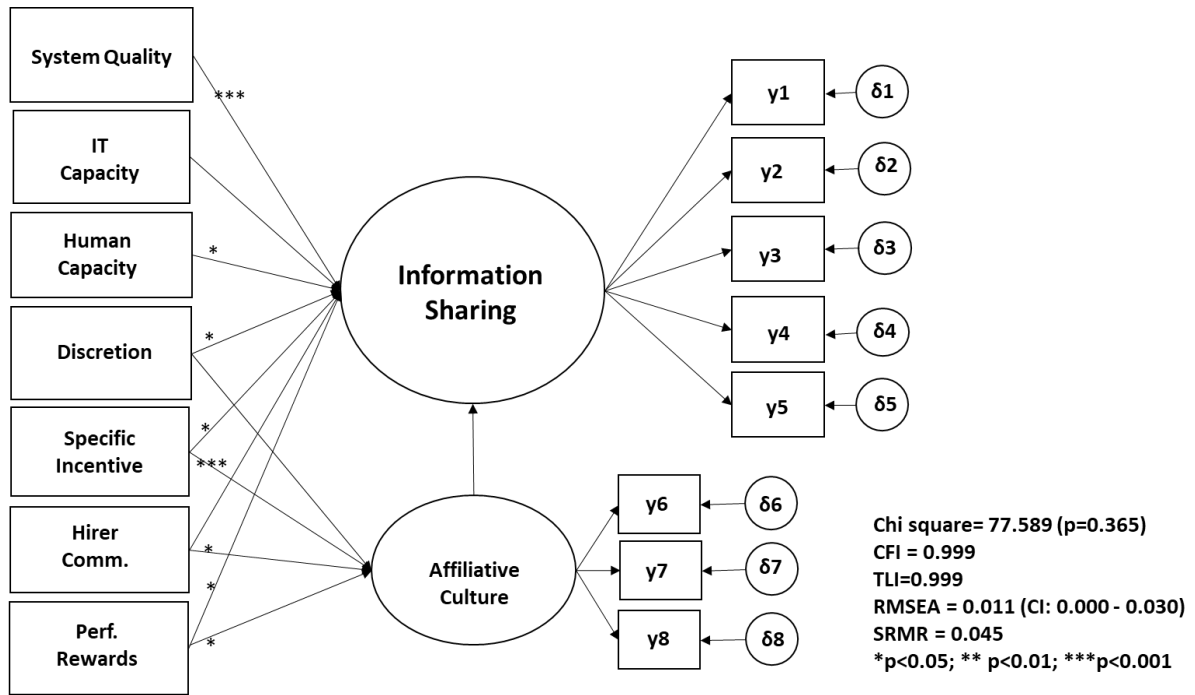


Figure 3-1. MIMIC-SEM MODEL of Information Sharing

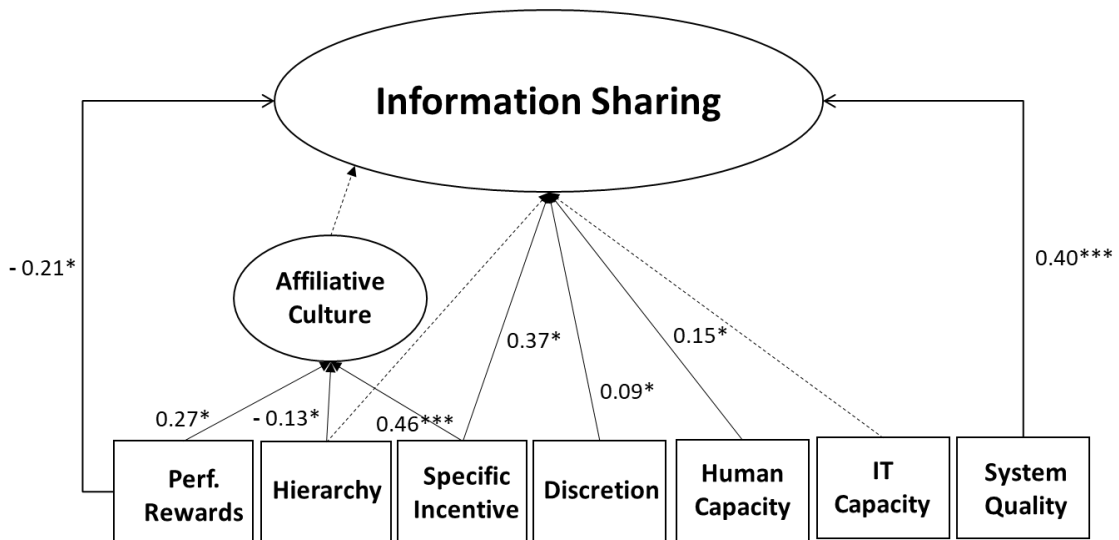


Figure 3-2. MIMIC-SEM: Institutional Context for Information Sharing

Conclusion

Over the years, we have seen various sustainability innovations occurring at local level. Local governments' leadership to simultaneously bridge environmental, economic, and social needs of their communities has been duly noted and discussed in a plethora of research across different fields of study. From these studies, we have learned that municipalities are not only voluntarily engaged in sustainability efforts, but also vary in their commitment level and these variations are systematically related to their local conditions (Bae and Feiock 2013; Daley, Sharp, and Bae 2013; Krause 2011; Portney and Berry 2010; 2016; Svava and Watt 2013). On the other hand, we relatively know little about sustainability implementation and management, because research evidence on post-adoption stages is largely lacking. An increasing number of case studies and government reports share the stories of challenge, needs, and success that local governments experience as they are moving from commitment to action. While case studies are invaluable in understanding local sustainability efforts, the highly contextualized information they offer also limits our ability to generalize the findings found in a single study. Large-N research that sketches the big picture and provides an aggregate understanding of local sustainability efforts is needed to complement the rich collection of case studies. This dissertation stands as an attempt to fill this gap in the literature.

From the review of qualitative evidence offered through case studies and best practices, this dissertation identifies and examines two major themes of strategies that are critical for advancing sustainability goals: collaboration and performance management. Chapter 1 examines the role of various institutional arrangements and mechanisms in helping local governments build collaborative capacity for sustainability management. The implementation of sustainability programs often requires a close coordination among different departments and

functions, given the crosscutting nature of sustainability, as embedded in the famous three-legged stool trope – environment, economic, and equity. Yet, little research evidence exists for what integrative mechanisms are currently in place among local governments, and which of those mechanisms are particularly effective for facilitating inter-departmental collaborative implementation of sustainability programs. Research on collaboration tends to emphasize that informal elements of collaboration, such as casual communications, ad-hoc meetings, and voluntary working groups are important for building strong and trusting collaborative ties (Emerson, Nabatchi, and Balogh 2012; Lam 2005; Ring and van de Ven 1994; Thomson and Perry 2006; Williams and Durrance 2008). On the other hand, a non-trivial number of studies also suggest that formal arrangements, such as mandates, rules, and authority matter for ensuring and sustaining credible commitment over time (Lam 2005; Provan and Milward 1995; Scharpf 2018; Tang 2018). Informed by these discussions, Chapter 1 empirically examines the types of coordination mechanisms employed by U.S. local governments to promote intra-governmental efforts to collaborate around the issue of sustainability.

Using a sample of 509 U.S. city and town governments with population over 20,000, the study finds supporting evidence for the significant role of informal dynamics in furthering collaborative capacity. Interestingly however, the results also show an indirect, yet highly significant path between formal institutions and collaborative capacity. This supports the view that informal determinants of collaborative network are essential ingredients of cohesive network, yet statutory and mandatory rules are also important for forging and reinforcing the cohesion factors. A few studies in the past have revealed these combined collaborative dynamics through case studies, yet this study is among the first that quantitatively models and statistically verifies the interplay between formal and informal drivers of collaboration. These findings, which are obtained from a relatively large-N sample, contribute to the literature by improving generalizability.

Chapter 2 then moves from implementation to performance management of sustainability programs. Data-driven approach to sustainability management can produce several benefits, including increasing efficiency and transparency, enabling evidence-based decision making, and garnering necessary political and administrative support from stakeholders for successful implementation (Melkers and Willoughby 2005; Moynihan 2008; Radin 2006; Taylor 2009). However, despite these expected benefits and the heightened interest in sustainability among local governments, little is known about how local governments are managing the performance of their sustainability activities and programs. Research tends to cluster around measurement only: i.e. asking what should be measured to reliably and validly embody the construct of sustainability (e.g. Adams, Muir, and Hoque 2014; Domingues et al. 2015; Williams, Wilmshurst, and Clift 2011). Developing a measurement framework that clearly defines and operationalizes sustainability performance is an integral part of effective performance management; yet equally important is understanding the drivers that enable and promote the utilization of the framework. Thus, there is a call in both research and practice that we need to start placing the discourse on sustainability performance metrics in the broader context of sustainability performance management systems (Lodhia, Jacobs, and Park 2012; Niemann and Hoppe 2018). Chapter 2 responds to this call.

To assess the effectiveness of the programs that localities variously adopted, Chapter 2 investigates local governments' engagement in sustainability performance management, particularly how they use performance information for improving the effectiveness of their sustainability programs and policies. Most performance management research observes that many public agencies practice passive performance management where they measure and report data without utilizing it for drawing implications for program improvement (Kroll 2015; Moynihan and Pandey 2010; Niemann and Hoppe 2017). Thus, research emphasizes the purposeful use of information for effective performance management. The primary interest of

this chapter is to understand how various institutional and non-institutional factors, such as community characteristics, are related to the purposeful use of performance information for sustainability performance management. Using a sample of 443 U.S. city and town governments with populations over 20,000, the study finds several factors are important for understanding why some municipalities better utilize performance information than others. The stakeholder involvement – both top management and the public – in performance measurement reviews is particularly found important. Local governments that display an increased level of performance information use in sustainability management are also found to have quality performance metrics, clear sustainability goals, and a culture that communicates the values of learning, creativity and performance-oriented management.

The last chapter deals with the emerging needs for information sharing in order to effectively manage public-sector performance. An institutionalized practice of intra-organizational information sharing can deliver several benefits, such as streamlining processes, reducing duplications and work errors, and improving social-emotional outcomes of organizational members (Jarvenpaa and Staples 2001; Willem and Buelens 2007). Despite the significance of information sharing for effective management, however, research finds information sharing still remains an exception rather than the norm among most public agencies. Several reasons explain why, including sensitivity to disclosing performance information and impediments rising from different processes, rules, and norms embedded in individual units. Therefore, major efforts are now underway to understand how an organizational context or environment can be designed such that it eases these challenges and enables individuals to share information for building organization-wide collective knowledge (Chen and Hsieh 2015; Cress, Kimmerle, and Hesse 2006; Weber and Khademian 2008; Willem and Buelens 2007; Zhang, Dawes, and Sarkis 2005)

Taking advantage of these discussions, which largely come from the field of information and knowledge management, Chapter 3 examines the institutional dynamics of information sharing in local sustainability performance management. In the case of sustainability, information sharing on key sustainability programs and activities is a must to arrive at a collective and holistic understanding of sustainability performance. This is true for not only implementing programs, but also managing the performance of the programs, as the quality of performance management systems rests on the rich and continuous inflows of information about organizational activities across different functions and divisions. Yet, little is known about information sharing dynamics for managing program performance, and even less for sustainability performance of the public sector. The investigation of 443 U.S. city and town governments' engagement in information sharing for sustainability performance management identifies several institutional conditions important for understanding city/town departments' behavior in creating a collective, organization-wide information base. Results highlight that supporting institutional mechanisms that is directly tied to information sharing, such as incentives and a quality system to generate information, are important for understanding how city departments engage in collective knowledge building for performance improvement. In other words, information sharing is most likely when there are such targeted efforts as recognizing sharing behaviors and establishing quality metrics that produce reliable, valid, and practically relevant information. By investigating the link between key institutional variables and information sharing as well as the interrelationships, Chapter 3 advances the understanding of institutional approach to what facilitates the reciprocal exchange of information that might otherwise exist in organizational silos.

In summary, through the examination of the three research questions, this dissertation provides an empirical understanding of local governments' sustainability efforts at post-adoption stages, and various factors that may impede or advance such efforts. Across studies,

three major findings arise: First, local governments are making progress towards sustainable communities, despite concerns about sustainability being a nonpriority for most municipalities or the potential retrogression with the shifting focus of the current administration. Many local governments of the study sample have established coordinating mechanisms and arrangements to further inter-departmental collaboration and performance systems to track the progress of their sustainability efforts. Although selection bias may be present given the nature of data utilized for this dissertation, a non-trivial number of local governments from big metropolitan cities to rural towns are represented in the sample, securing sufficient variations for performing sound analyses.

Second, the institutional context, as shaped by various institutions, does matter for effective sustainability management, yet show some complex dynamics across chapters. In order to better assess the connection between institutional conditions and managerial practices, this dissertation employs two prominent traditions of institutional theories: rational-choice institutionalism that primarily focuses on formal and structural institutions and sociological institutionalism that broadly considers informal and cultural institutions in understanding organizational behavior. Overall, this dissertation finds supporting evidence for the role of sociological factors in fostering a collaborative, data-driven approach to sustainability management, such as personal communications and informal meetings (CH1) and culture and engagement of key stakeholders (CH2). Knowing that a particular action is desired by their peers and stakeholders, through personal interactions, cultural messages, and cues from stakeholder actions, can significantly influence the behavior of local governments. Nonetheless, such cultural and social cues must be directly tied to the specific action or change an organization desires to make. As found in Chapter 3, a culture that communicates the importance of general collaborative behavior does not directly influence information sharing practice, although it is close to being significant at .05 level. The borderline significance may

be attributed to potentially inconsistent cultural messages, as the sample governments that use performance information for rewarding their employees also tend to emphasize collaboration. It is possible that when culture signals seemingly paradoxical messages (i.e. help each other but performance is recognized on individual bases), it can nullify the desired effects that it is supposed to bring. The importance of institutions that are directly tied to the desired organizational action is further found in the case of formal institutions. Formal institutions (e.g. structure and mandates) tend to have effects that are either indirect (CH1) or of smaller magnitude (CH2 and CH3); yet fairly substantial amounts of effects are observed, when they are designed such that they directly target the desired action, such as the quality of measurement system specific to the desired managerial practice rather than general capacity (CH2), and formal incentives specifically designed for information sharing (CH3).

Lastly and related to the previous point, findings in this dissertation show the level of intricacy involved in understanding the local institutional contexts for managing public policies and programs. Across the three studies, interdependent and intertwined relationships are found between formal/structural institutions and informal/cultural institutions, suggesting a complex picture of organizational contexts. This point is particularly well demonstrated in Chapter 3 that explicitly models and finds evidence for interrelationships between culture and other structural institutions. Therefore, I would like to conclude by quoting Moynihan and Landuyt (2009) who explain that “[w]hile the dichotomy of structure versus culture is heuristically appealing, it obfuscates a messier reality.” Both types of institutions constitute the larger context of an institutional environment where they constantly interact – sometimes creating synergy and other times contradicting each other – and together lead to different organizational choices, actions, and outcomes.

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