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Article

Social Capital and Longitudinal Change in Sustainability Plans and Policies: U.S. Cities from 2000 to 2010

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Abstract: This study examines changes from 2000 to 2010 in the adoption of sustainability plans and policies in a sample of U.S. cities. The study's framework posits sustainability initiatives as communitarian outcomes intended to meet the needs of both current and future generations. We hypothesize, accordingly, that a community's social capital level, in the form of the relative presence of social trust, is a primary facilitating condition for the adoption of sustainability initiatives. The analysis assesses whether trust-based social capital is similarly associated with the adoption of plans and policies at both time points (2000 and 2010), as well as whether social capital is associated with change in the adoption levels documented across the ten-year period. The paper concludes by suggesting that the effect of social capital is substantially reduced in 2010 as a consequence of institutional network dynamics featured in the theory of isomorphic change.

Keywords: sustainability; social capital; resilience; urban planning; communitarian values; best practices; isomorphism

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1. Introduction

In the wake of several decades of innovative work [1], recent researchers continue to examine the adoption of sustainability initiatives at the local government level [2–11]. Nonetheless, little is known about longitudinal change in the presence of sustainability initiatives within the same cities. Thus, the study reported here examines changes taking place from 2000 to 2010 in the adoption of sustainability plans and policies in a set of U.S. cities. This study reflects the belief that these sustainability initiatives are communitarian outcomes intended to meet the needs of both current and future generations [1]. In this context, we hypothesize that a community's social capital level, defined as the relative presence of social trust, is a primary facilitating condition for the adoption of sustainability initiatives. This study also assesses whether trust-based social capital is similarly associated with that adoption at both the 2000 and 2010 time points and whether social capital is associated with change in adoption levels across the ten-year period. The analysis concludes by suggesting isomorphic forces as a possible explanation for the observed results [12].

2. Sustainability

Sustainability obtains when the attributes of a socio-ecological system ensure that the needs of current populations are met without placing at risk the needs of future generations [13]. The needs identified in this widely used conceptualization of sustainability generally are organized into three "E" domains: environmental, economic and equity [14–16].

The *environment* exhibits sustainability to the degree that consumption levels and their consequences ensure the long-term aesthetic, productive and non-hazardous viability of natural resources. This viability is evidenced both in terms of the continued availability of a supply of natural resources sufficient to ensure the capacity to support a population, as well as in terms of preserving the aesthetic and health-related quality of the environmental conditions within which people live [17].

Economic sustainability refers to the continued presence of sufficient resources (e.g., finances, skills, materials) to ensure a persistent and acceptable quality of life for a population [18]. That quality of life requires those economic resources to support reasonable levels of access to aesthetic (cultural), nutritional, security, housing, transportation and employment opportunities sufficient for individuals effectively to meet their individual needs without compromising the sustainability of the environment.

The social *equity* dimension of sustainability captures the cross-population (horizontal) and cross-time (longitudinal) *distribution* of social, economic and environmental goods [19,20]. In this context, *horizontal* sustainability ensures that no segment of a community (e.g., global, local) is systematically excluded from the conditions that enable its members to satisfy their basic needs. *Vertical* sustainability extends the consideration of equitable access to the satisfaction of those needs across multiple generations. Thus, a sustainable society will eschew encumbering future generations' ability to meet those needs as a consequence of the current generation's fulfilling its own needs.

The search for sustainability is especially crucial in systems subject to significant external disturbances (e.g., hurricanes, earthquakes, climatic, economic, ecological, political/terrorism, armed conflict). In the face of those significant disturbances, sustainable systems must be resilient [10,21–23]. This resilience, however, does not necessarily imply a return to a pre-disturbance form or structure, but

rather to the sustainability-relevant content of the environmental, economic or equity outcomes produced by whatever specific forms the resulting system happens to take.

In this context, a number of explanations have been forwarded for the adoption of sustainability plans and policies. Wang *et al.* focus on organizational strategies [8], while Brian Sinclair emphasized the role of culture and context [24]. In their study of state environmental policymaking, Daley and Garand concluded "strong state hazardous waste programs are a function of state wealth and the severity of internal hazardous waste problems, as well as external determinants, with regional diffusion as a particularly influential factor" ([25], p. 615). Saha has suggested that political culture should be considered as a source of sustainability policy [26], while Sharp, Daley and Lynch focus on the importance of civic capacity [6]. Saavedra *et al.* also focused on the local culture and identified the importance of the presence of a risk-taking attitude [7]. Among important sources of sustainability adoption, Daley *et al.* [27] and Hawkins and Wang [28] included political institutions, organized interests and civic capacity, the severity of the need or policy and the extent of participation in sustainability and climate protection networks. Importantly for the study here, Krause has concluded that "…dynamic models may offer important additional insights" ([29], p. 57). Building on this literature, as well as a vast treasury of additional work (e.g., [30]), the research reported here focuses on the role of social capital in the adoption of sustainability plans and policies at two different time points separated by ten years. The following section describes the conceptual foundation for that focus.

3. Social Capital and Sustainability

A dominant, albeit contested, theoretical perspective in the past two decades, *social capital* is viewed as a resource (capital) that emerges from ''the norms and social relations embedded in the social structure of societies that enables people to coordinate action to achieve desired goals'' ([31], p. 126), (see also [9,32–34]). This coordinated collective action is based on trust in others, a belief that both facilitates and stems from the initiation of affiliations and networks [35–38]. Moreover, social capital has been identified as bonding (within groups or sets of individuals sharing important attributes), bridging (across more distantly related groups or sets of individuals) and linking (among various strata or levels in hierarchical political or social structures). Bridging social capital is most frequently seen as requisite for success in external environments, such as the influence on the political structure in achieving communitarian ends. Linking social capital "reaches out to unlike people in dissimilar situations" [39].

While social capital generally is seen as a potentially positive resource enabling the achievement of communitarian, shared public goods [38], tightly bonded social capital also facilitates mobilization and coordinated activities limited to shared network goals. Indeed, some scholars have identified what they believe to be a "dark" side to social capital [38,40,41]. This dark side emerges when bonding social capital produces tight internal controls over group members, or when the shared activity produces what might be seen as negative outcomes.

Likewise, questions have been raised about the causal direction of social capital's relationships to other political and social attributes [1,42–45]. In the context of participation (itself related to social capital), Portney and Berry nonetheless recently observed: "This analysis cannot sort out, with any precision, whether there is a causal connection between participation and the pursuit of local

sustainability policies or what the direction of that causation might be. It does, however, provide evidence as to whether there is enough of an association to suggest a plausible connection" ([3], p. 120). Thus, if one finds that more extensive sustainability implementation obtains in higher social capital environments, does that mean that social capital has resulted in the sustainability or does it mean that the presence of sustainability has led individuals to hold greater trust in other people? The particular answer one gives to this question surely depends on the research question, but the observer nonetheless must remain sensitive to temporal and causal considerations. In either case, substantial variations among urban areas have been found in the levels of trust and social capital [46–48]. The variations in question are associated with differences in such additional attributes as the quality of performance of local government [49], the rate of compliance with taxes [50] and trust in government generally [51].

Among others, Pretty and Smith observe that social capital "captures the idea that social bonds and norms are important for sustainability" ([52], p. 633). Indeed, resilience-related sustainability efforts are seen to rely on the trust-based collective activity imbedded in social capital [10,53,54]. Likewise, Folke suggests that "social networks serve as the web that seems to tie together the adaptive governance system"—a community-level trait that he believes is crucial to resilience ([22], p. 261). Moreover, Dietz *et al.* argue that "commons governance is easier to achieve when...communities maintain frequent face-to-face communication and dense social networks—sometimes called social capital—that increase the potential for trust, allow people to express and see emotional reactions to distrust, and lower the cost of monitoring behavior and inducing rule compliance" ([55], p. 1907).

Sustainability is frequently viewed as a public goods/commons concept, one in which free-riding emerges, but Ryden and Homan also suggest that social capital facilitates overcoming free-riding in "sustainable environmental management through altering the costs and benefits of direct action" ([56], p. 128). Likewise, in the context of discussing variables that contribute to the sustainability of social-economic systems, Ostrom writes that groups wherein individuals hold "norms of reciprocity and have sufficient trust in one another to keep agreements will face lower transaction costs in reaching agreements and lower costs of monitoring" ([57], p. 421). Similarly, Edwards and Onyx write, "…there is considerable evidence that high levels of social capital may well be a prerequisite for the process of reconciliation between the ecological, the social and the economic imperatives" ([58], p. 20). Ann Dale and Lenore Newman also examine the role of social capital in Vancouver, B.C., and conclude that while it (social capital) may be a necessary component of sustainable community development, it is not a sufficient condition, needing to be coupled with strong leadership and external enabling conditions [59].

While considerable theory and evidence obtain in regard to the role of social capital in the development of sustainability efforts in urban contexts, few if any works actually examine empirically both the change in those efforts and the consistency of the role of causal factors, such as social capital across a significant time period and for the same set of contexts. A significant exception is the work of Kent Portney in the recent second edition of his seminal work *Taking Sustainable Cities Seriously* [30]. Portney traced the change from 2003 to 2011 in sustainability index scores in thirteen cities. He concluded that: "On average, across these thirteen cities, ten new programs were added between 2003 and 2011, suggesting that cities' ideas about what constitutes sustainability, and what they can and should do to try to become more sustainable, has expanded and matures" ([30], p. 83). In some ways, the research reported here parallels that of Portney, namely a consideration of longitudinal change and the city being the unit of analysis. In other ways, our work builds on Portney's in that we

examine that change in 40 cities, and while Portney considers the related concept of the communitarian foundations of sustainability, we focus more explicitly on social capital-related generalized trust that may provide the fuel for the adoption of sustainability plans and policies and explore the implications of the change in that role across time.

4. Hypotheses

Based on the above discussion, our general hypothesis is that greater sustainability efforts will be found among urban areas with higher levels of trust-based social capital [9,10]. Thus, for two reasons, we suggest that social capital will lead to the adoption of sustainability plans and policies. First, the interpersonal social trust embedded in networks is consistent with the communitarian values exhibited in sustainability plans and policies, and second is that network-based trust provides an important resource (social capital) that can be employed to promote policies consistent with those communitarian values.

The following hypotheses thereby provide the standard against which the research findings below are juxtaposed.

Hypothesis 1. Adoption of sustainability plans and policies increased from 2000 to 2010.

Hypothesis 2. Social capital effects on the presence of sustainability plans and policies are statistically significant and positive in both 2000 and 2010.

5. The Study

5.1. The Cities

This study involves municipalities lying within the boundaries of major media markets that have been systematically surveyed by Leigh Stowell and Company (of Seattle, WA). The raw data files from these market field surveys were donated to Washington State University [9,10] for use in faculty and graduate student research in the College of Liberal Arts and the Edward R. Murrow College of Communication. The data files in question feature over 400 market research studies conducted among citizens of many of the major media markets in the U.S. and Canada over the period 1989 to 2005. These studies were conducted for marketing executives employed in major city newspapers and the principal local affiliates of the ABC, CBS and NBC networks and featured a great deal of common content, so that cross-city comparisons could be noted and capitalized upon in the tailoring of advertising content of media clients. The number of cities from this pool of market studies ranges from 25 to 47, depending on the availability of data being used in the analysis. In each of the studies, the method of contact with survey respondents was random digit dialing via a computer-assisted telephone interview, with multiple call-backs (up to four) of selected phone numbers. All surveys were conducted with trained and experienced interviewers, with random monitoring by Leigh Stowell staff to ensure uniformity in administration. The number of citizens interviewed for each market survey ranged from 750 to 2000, depending on the size of the city and the number of significant racial/ethnic subpopulations present (e.g., large black and or Latino population concentrations), with "the sample drawn in proportion to the households in the defined market area." The sample frame included all households with telephones in the particular market area [60]:

> Telephone prefixes falling within the sample frame are defined, then pulled in proportion to all area listings and assigned randomly generated four-digit sets. (An excess of these randomly generated telephone numbers is prepared to allow for disconnects, language barriers, refusals, businesses and so forth). Use of randomly generated numbers allows unlisted and unpublished telephone numbers to fall into the sample, so that all households with a telephone within the defined market area have a nearly equal chance of being sampled [60].

Respondents are screened according to certain demographic characteristics (e.g., sex) and are systematically rotated. Up to four call backs were made.

Most of the Leigh Stowell and Company market surveys featured a common set of belief and attitude items, which the Seattle-based firm characterized as *psychographics*; some of these items comprise a central measure of trust-based social capital employed in this study. This survey-based information derived from the Stowell datasets was augmented by city-level information drawn from other sources, such as the U.S. Census and similar reliable informational repositories. It is most certainly the case that the set of U.S. cities featured in this study do not constitute a true sample of all the U.S. (see the Appendix for a list of cities included in this study). However, the regional dispersion, range of city size, demographic diversity and considerable differences in principal forms of economic and commercial activity taking place in this set of U.S. cities justifies considerable *prima facie* validity to the drawing of generalized conclusions from the analyses presented here. Indeed, the cities are found in all regions of the country, are located in 24 different states and represent a range of types of political culture found in the U.S. [61]. On the other hand, while the study's dependent variables are measured at the specific city level, the survey-based social capital measure reflects the distribution of question responses across a broader market area. Thus, the two sets of data are not geographically identical, with the market area subsuming the city area, but also with the latter generally comprising the larger proportion of the survey sample. Therefore, one may wish to temper the conclusions based on observed empirical relationships. At the same time, though, a very strong case can be made that political cultures, such as those reflected in social capital levels, are not bounded by those specific political boundaries. For example, Elazar's seminal work on the "The impact of space, time and culture on American politics" identifies three dominant political cultures in the U.S. (individualistic, traditionalistic and moralistic) and locates them in regions within each state without regard to specific political boundaries and with the clear implication that the regional political cultures are central for the character of local communities [61]. Thus, we believe it legitimate to assess whether the broader cultural context surrounding a specific city may provide a signal influence on that city's public policies and plans in regard to sustainability.

5.2. Dependent Variable

This study's measure of commitment to sustainability focuses on planning and policy initiatives rather than on the assessment of actual environmental, economic and equity conditions. The emphasis on policy and planning is central to resilience and adaptability to future disruptions ([23], p. 569): "the plans and policies of a city provide visibility, accountability, symbolism, prioritization and a road map for adapting to system threats or disruption" [10]. Thus, we identified and assessed five plans and policies as indicators of commitment to sustainability. For the 2000 data, graduate students at a major

land-grant university conducted content analyses of city websites, comprehensive plans, annual budget reports and related policy documents [9,10]. The present study replicated the 2000 analyses for 2010 for the same cities with the coding also conducted by a graduate student assistant at the University of Kansas, following as closely as possible the same coding scheme as was developed in 2000. That coding scheme involves the following five elements:

(1). *Presence of an indicator project*. The municipality engages in the specification of target measures of preferred levels (e.g., greenhouse gases inventory) and actively monitors change to assess progress toward those levels [62,63]. One index point is awarded if the municipal government maintains an indicator project or is an active voluntary participant in a third party indicator project.

(2). *Active engagement in smart growth activities*. Smart growth entails merging the goals of economic growth with concern for environmental protection and social equity in such a way that economic vitality and ecological sustainability are being pursued simultaneously [64–66]. Terms such as quality of life and sustainability and environmental justice are common elements of smart growth planning practice [67–69]. To determine the degree to which a municipal government has adopted elements of smart growth into its comprehensive plan, a word search of that document was conducted for these specific terms: smart growth; brownfield development; clustered development; zoning for environmentally sensitive areas, pedestrian-friendly areas and mixed-use development; carpools; jogging and bicycle paths; commuter trains and mass transit; eco-industrial parks; and inner/core city development. No index point is awarded if these terms are absent from the comprehensive plan; one half of a point is awarded if some of these terms appear, but without detail; a full index point is awarded if some of these terms are mentioned and elaborated upon with specific references to concrete municipal activities and/or programs.

(3). *The presence of a vision statement with specific reference to sustainability*. Municipal comprehensive plans were searched for the key term "sustainable development" in those portions of the plans that set forth the broader collective goals and objectives of the city. Cities were awarded one index point if this specific term appears in such portions of their comprehensive plans and awarded a zero if no such mention of this concept is found in the relevant sections of the municipal comprehensive plan. The following are examples of such statements identified in the 2010 study:

The Community Character Manual provides information that enables residents, business owners, property owners, institutional representatives, developers, and elected officials to take a proactive role in the community planning process to preserve the diversity of development that is a hallmark of Nashville/Davidson County and create sustainable development for the future ([70], p. 8).

Overall Plan Vision: Kalamazoo will endure as a great place to live, work, learn, and visit. The bulk of what makes Kalamazoo great is already in place through its dynamic cultural and educational resources, businesses, neighborhoods, downtown, commitment to good planning, and rich diversity of citizens. The city needs to ensure its sustainability, preserve its assets, enhance existing spaces, and transform specific areas into more economically viable places. The strategies of this plan can be summarized by three words: Preserve, Enhance, Transform *([71], p. 7).*

The City's overall economic goal is to continue as a sustainable community in order to enhance the quality of life for all Dallas citizens. This goal is best achieved by increasing economic opportunities without threatening environmental quality or eroding the region's natural resource base ([72], p. 5).

We want Virginia Beach to be a city of sustainable development, economic vitality, and lifelong learning. We want to ensure the opportunity to start and grow a business, or for one to enter into and prosper in the local job market. Moreover, we want Virginia Beach to be on the "cutting edge" of new technologies, particularly those that generate renewable energy, which will ensure continued economic growth that will endure and will be sustainable into the future. In addition to providing our children with a strong foundation for learning and growth, our schools provide venues for public involvement in many activities and are a major source of civic pride. For these reasons, it is important that we recognize the many contributions our school systems make to the overall quality of life in our community ([73], pp.1–2).

(4) *The presence of an energy conservation program*. As was the case with smart growth, the municipal comprehensive plans for the cities in this study were subjected to a word search for the following specific terms associated with energy conservation: energy conservation; energy-efficient fleet vehicles; green buildings; renewable energy; alternative energy; greenbelts; rooftop gardens; public awareness promotion of energy conservation. If a city made note of two or more of these measures to promote energy conservation, it was awarded one index point.

(5) *A designated unit committed to the promotion of sustainability*. A city-funded unit dedicated to sustainability represents a significant commitment of municipal resources. Such a unit represents both a symbolic cue to the citizenry and signals an organization priority within city government to all municipal agencies. In this case, the municipal website for each city was searched for evidence of the presence of such a unit. One index point was awarded to those cities that had established such a unit by 2010; no index points were awarded if the presence of such a unit could not be verified from an official website search.

A *summative* measure of sustainability plans and policies was created by adding each city's scores across the five sub-measures, with a possible top score of five and a possible low score of zero. In order to assess the validity of this study's measure, we correlated the *rank order* of the cities in this study with the rank order of those cities (n = 31) also in a report issued by Sustainlane [74]. The ranks of the cities on the two measures are highly correlated (Rho = 0.61, $p \leq 0.01$). We also correlated the sustainability plans and policies scores in our dataset with summary scores based in 38 elements of the "Index of Taking Sustainable Cities Seriously" for the year 2011 reported by Portney [30] for those cities included in both studies (n = 29). Our measure for the year 2000 is correlated with the Portney 2011 measure at r = 0.249, $p = 0.097$, while for our more temporally proximate 2010 data, the correlation with the Portney 2011 data is r = 0.323, $p = 0.044$. Moreover, the two measures (ours from 2010 and Portney's from 2011) are correlated at approximately the same level with our trust-based social capital measure: r = 0.236 and r = 0.284, respectively. Given that our measure is not designed to be a comprehensive, community-wide picture of sustainability, but rather a more narrow focus on governmental plans and policies, the shared variance suggests the presence of common content to the measures, albeit not the presence of an identity

5.3. Social Capital

Three items in the Stowell data are available across 40 urban areas featured in this study (see below). The average mean score within each urban area on those three survey items is calculated to create an index of trust-based social capital for each area. In each of the items the highest value (strongly agree = 5) is the cynical or non-trusting response; so, the higher the average across the three items, the lower the trust. The three items are:

(1). I often feel that my opinions are not taken seriously
(trust others will give due concern to an expression of one's opinions).
(2). Most public officials today are only interested in people with money
(trust in public officials).
(3). Too many people are getting a free ride in today's society
(concern for free riding; depressant upon collective action).

To be sure, aggregate trust levels are only one of the two core components of social capital, the other being the density of associations. As validation of the linkage of trust to association density, we correlated responses to the item of "Too many people are getting a free ride in today's society" (aggregated within 342 counties within Stowell survey datasets) with an association density-based measure of county social capital. The association density measure is a county-level factor score produced by Rupasingha *et al.*'s principal components analysis of the per capital presence of 10 different kinds of organizations, and the three variables of presidential vote turnout, census survey response rate and non-profits per capita [75]. That measure reflects Putnam's argument that social capital is comprised of both "social networks and the associated norms of reciprocity" resulting in $r = -0.41$, $p \leq 0.001$ (the negative sign indicates that the trustful response—disagreeing with the item—is associated with greater county social capital). Moreover, it is clear that these items reflect generalized trust rather than community-specific targets of that attitude. This is consistent with Putnam's contention that "the touchstone of social capital is the principle of generalized reciprocity" [38]. Given our earlier identification of bridging and bonding forms of social capital, we see this indicator as reflecting the former—bridging generalized trust facilitating cross-network collaboration that produces such public goods as those embedded in sustainability [76].

5.4. Control Variables

In the following analysis of the impact of social capital, we serially control for a set of variables that might also account for patterns of adoption of sustainability plans and policies. The purpose is to determine if social capital effects remain under those controls.

(1). *Moralistic political culture.* This variable reflects the relative presence of moralistic, communitarian political cultures as mapped by Daniel Elazar [61,77,78]. Such a culture would be expected to produce greater commitment to the development of sustainability plans and policies. Based in overlaying another U.S. map with cities identified on Elazar's map, each of the urban areas in our study is coded on the moralistic culture, with a "0" indicating no presence of that culture, a "1" indicating a secondary presence, a "2" indicating a dominant presence and a "3" indicating a solitary presence of that culture.

(2). *Creative culture.* Richard Florida [79] argues that the relative presence of a creative culture is a primary determinant of a city's growth and development. We would expect such creative cultures to be more likely to produce a commitment to sustainability plans and policies given that the latter clearly are major innovations in public policy. Florida identified and measured four sub-dimensions of such a culture: the presence of a creative class, the number of patents per capita, the degree of the presence of a high-tech industry and the diversity in the population as indicated by what he called a "Gay Index". He combined those four into a single index score, which we have integrated into the dataset for the cities employed in our study.

(3). *Ethnic diversity.* Racial/ethnic diversity for the year 2000, as suggested by the Hero [80] formula, in consideration of the possibility that such diversity may make it more difficult to find common ground in the pursuit of any type of communitarian policy goals [81].

(4). *Income inequality*, as measured by the Gini Index of inequality for household incomes from 2000 census data, to consider whether this socio-economic condition inhibits the capacity to mobilize in support of both resilience and sustainability.

(5). *Population size.* Portney [30] has examined the proposition that cities of different sizes "have advantages or disadvantages that influence how extensively or seriously they can take the pursuit of sustainability". He found that among the country's fifty-five largest cities, "When the log of population size is correlated with the index, the correlation rises to 0.39" ([30], p. 231). Thus, we also control for the log of both the 2000 and 2010 MSA (Metropolitan Statistical Area) populations.

(6). *Income levels.* We also introduce a control for the median household income level in MSA, taking into account the possibility that urban areas with greater wealth will be more likely to have access to economic resources, seen to be required for investment in sustainability plans and policies. As an indicator of income, we employ the median household income in the relevant MSA from 2000 census data.

(7). *Education* in the form of the percentage with a bachelor education as reported in the 2000 census, because formal education levels are one indicator of human capital available to strengthen communities [82].

(8). *Perceived threat.* This measure is based on a survey of American county officials in regard to emergency management conducted for the National Association of Counties by Wes Clarke of the Carl Vinson Institute of Government at the University of Georgia [83]. We included the perceived threat variable because of the possibility that cities perceiving a greater threat would be more likely to enact sustainability plans and policies independent of social capital levels. County officials surveyed were asked to indicate the degree to which they perceived each of 20 different conditions (e.g., earthquakes, tsunamis, hazardous waste spills) to be a threat to their county. We were able to merge a subset of the counties (n = 25) with our set of cities. A factor analysis of the responses produced five factors, which are labeled when presented in the tables below.

6. Findings

The 2000 and 2010 mean scores on the summary measure and on each of these five components of sustainability plans and policies are shown in Table 1. The findings in Table 1 tend to confirm Hypothesis 1. In each case, there was growth in the proportion of the sample that has implemented the

particular plan and/or policies, as well as in the overall summary measure. By far the largest growth from 2000 to 2010 is in the presence of a sustainability office or a formally assigned responsibility for sustainability, rising sharply from 11 per cent to 80 per cent of the cities. Large growth also is evident for both the indicator measure and the conservation plan measure. However, the opportunity for change was extremely limited for the smart growth sub-dimension, with 90 percent of the cities having already implemented smart growth in 2000. By 2010, nearly universal adoption was obtained for smart growth plans and for conservation plans; and, the presence of sustainability offices reached 4/5th of the cities. Even the two lowest levels of implementation (the vision and indicators items) reach approximately two-thirds of the cities by 2010. Moreover, the average city score on the summative measure rises from 2.66 to 4.01, reflecting nearly 80 percent implementation across the plans and policies.

Table 1. 2000–2010 average scores [a] on five sustainability plans and policies variables.

Variable	2000	2010	t-sig	N
Indicators	0.48	0.67	0.001	(47)
Smart Growth	0.90	0.98	0.033	(47)
Vision	0.55	0.62	0.183	(47)
Conservation Plan	0.63	0.94	0.000	(47)
Sustainability Office	0.11	0.80	0.000	(46)
Summative Index	2.66	4.01	0.000	(46)

[a] Individual measures are described in the text. The scores on the separate variables range from zero to 1.0, while the summative index ranges from zero to five.

The effects of change on the *convergence* of adoption patterns is shown in Table 2, which contains the variance statistics for the sustainability measures at the two time periods. The variance on the summative measure in 2000 is 1.40, but falls to only 0.67 in 2010, a difference of −0.73 ($p \leq 0.01$). This reflects considerable *convergence* among the cities in their level of adoption of sustainability plans and policies.

Table 2. 2000–2010 change in the *variance* of individual measures of sustainability plans and policies [a].

Measure	2000	2010	t	*p*
Summative	1.40	0.67	3.3	0.002
Indicator	0.23	0.19	1.6	0.122
Smart Growth	0.07	0.02	2.0	0.048
Vision Statement	0.25	0.24	0.9	0.380
Conservation Plan	0.22	0.06	5.1	0.000
Sustainability Office	0.10	0.17	1.1	0.276

[a] The entry in each cell is the variance for that measure for that year.

Small, but significant, variance change also occurs for two of the five individual sub-measures: smart growth from 0.07 to 0.02 ($p \leq 0.05$); and conservation plans from 0.22 to 0.06 ($p \leq 0.001$). At the same time, though, the variance for the presence of a sustainability office or administrator actually increased from 0.10 to 0.17, reflecting the nature of the variance change measure. That is, while the greatest change (increase) was obtained in the presence of a sustainability office (see Table 1), the

2000 variance on that variable was smaller than that in 2010, because of the relative uniform *absence* in the earlier year, while the marginally larger variance in 2010 reflects its generally uniform *presence*.

These results underscore the importance of focusing *both* on the absolute change in the similarity (the variance) of the cities and on the magnitude and *direction* of that change. Doing so, we conclude that there is both significant change and apparent convergence in the implementation of sustainability plans and policies.

The second question is whether the adoption of sustainability plans and policies is similarly affected by social capital and the control variables at the two time periods. In particular, the study's null hypothesis suggests that the effects of social capital (trust) will be no different at the initial point (2000) than at the ten-year point (2010). In order to focus the analysis, Table 3 contains the standardized regression coefficients (b) for the regression of only the summative sustainability measure on social capital/trust. Because of the small sample size, each of the control variables is entered separately. Table 3 shows that in 2000, social capital has a significant effect (b) on sustainability when each of the control variables is considered along with it. On the other hand, only one of the control variables (income inequality) has a significant (and negative, in this case) effect. In 2010, however, the size of the social capital effects are reduced substantially from 2000, and none of them reaches significance. To be sure, in most cases, the social capital effects remain stronger than those of the control variables, and in 2010, the income inequality variable remains significant in its negative impact on the summative sustainability measure. However, given the different findings reported for 2000 and 2010, we reject the hypothesis of no change in the relationship of social capital to the total level of commitment to sustainability plans and policies. Exploratory multiple regressions also were conducted for both 2000 and 2010 with five independent variables (social capital, median income for respective year, logged population for respective year, education, and income inequality). The same pattern was obtained, namely in 2000 social capital is the only statistically significant variable (b = 0.35, p = 0.054); in 2010, however, the impact for social capital is much smaller (b = 0.12, p = 0.51). On the other hand, in 2010 the Gini Index of inequality exhibited a significant effect (b = −0.33, p = 0.068). Moreover, if one focuses on the changes in the effect size rather than the probability, as is suggested in some contributors to the literature on small sample research [84], then the contrast of social capital effects in 2000 (b = 0.35) with those in 2010 (b = 0.12) becomes even more stark.

Table 3. Social capital effects (b) on sustainability plans and policies, under controls [a].

Control Variable	2000		2010	
	(b) Social Capital	(b) Control	(b) Social Capital	(b) Control
Moralistic Culture	0.42 **	0.08	0.22	0.06
Creative Culture	0.34 **	0.11	0.12	0.26
Diversity (Hero)	0.38 **	−0.08	0.23	−0.06
Income Inequality	0.33 **	−0.29 *	0.19	−0.28 **
%Bachelor Degree	0.39 *	−0.04	0.22	0.07
Median HH Income	0.29 *	0.30 *	0.10	0.43 **
Population 2000	0.41 **	−0.18	0.27	0.10
Population 2010	0.40 **	−0.22	0.28	0.11
Sea/Tsunami	0.50 ***	0.16	0.30	0.08

Table 3. *Cont.*

Control Variable	2000		2010	
	(b) Social Capital	(b) Control	(b) Social Capital	(b) Control
Chemical/Terror	0.54 ***	−0.04	0.31	0.09
Transportation	0.56 ***	−0.27	0.32	−0.14
Heat/Lightning	0.52 ***	−0.10	0.33	0.10
Weather	0.54 ***	0.05	0.33	0.07

n = 40, except for vulnerability measures (n = 25). [a] The entry in each cell is the standardized regression coefficient of social capital and of the particular control variable when entered together in a multiple regression predicting the summary measure of sustainability plans and policies. The population measures are logged.

Moreover, Table 4 shows that under a broad range of controls, social capital is *negatively* related to the amount of *change* in the summary measure of sustainability plans and policies from 2000 to 2010. This pattern is obtained, because the year 2000 high social capital cities were more likely to be early adopters, and those cities that changed during the period had lower initial social capital scores.

Table 4. Coefficients (b) of 2000–2010 *change* in the summary sustainability measure on social capital.

Control Variable	(b) Social Capital	(b) Control Variable
Moralistic Culture	−0.36 *	0.11
Creative Culture	−0.36 *	0.10
Diversity	−0.30	0.07
Inequality	−0.28 *	0.13
Education (%BA)	−0.34 *	0.13
Median Household Income	0.30 *	0.00
2000 Population	0.34 **	0.36 **
2010 Population	0.33 **	0.42 **
Sea/Tsunami Vulnerability	−0.41	−0.20
Chemical Terror Vulnerability	−0.47 **	0.06
Transportation Vulnerability	−0.46 **	0.44 **
Heat-Lightning Vulnerability	−0.44 **	0.20
Weather Vulnerability	−0.47 **	−0.08

* $p \leq 0.10$; ** $p \leq 0.05$; ***$p \leq 0.01$.

Further evidence in regard to the 2000–2010 changes in the social capital source of sustainability plans and policies is shown in Table 5. That table disaggregates the sample into two approximately equal groups by dividing the 2000 adoption distribution at the approximate midpoint. Twenty-two cities are above that mid-point (>2.0), and 26 are below that midpoint (≤2.0). First, for each group, we assessed the effects (b) of social capital on absolute change from 2000 to 2010. Second, we then assessed for the same two groups the effect (b) of social capital on the 2010 plans and policies adoption score. Recall that as a consequence of the directionality of the response alternatives, the higher value on the trust measure reflects cynicism. Thus, we have reversed the signs in the presentation in order to be consistent with the substantive direction of the argument. The results in Table 5 indicate that for the initially (2000) *low* (below median) adopters, the effects (b = 0.12, $p = 0.59$) of

social capital are minimal on variations in the level of adoption in 2010. Moreover, for the 2000 low adopters, social capital also has minimal effects (b = 0.10, p = 0.68) on the amount of change from 2000 to 2010.

Table 5. Effects of social capital on 2000–2010 adoption changes for low and high 2000 adopters [*].

Analysis	2000 Low Adopters	2000 High Adopters
Effect of Social Capital on 2010 Adoption	B = 0.12 (t = 0.54; p = 0.59)	B = −0.07 (t = −0.29; p = 0.78)
Effect of Social Capital on 2000–2010 Change	B = 0.10 (t = 0.42; p = 0.69)	B = −0.25 (t = −0.10; p = 0.32)

[*] The direction of the signs for the standardized regression coefficients (b) has been reversed in order to reflect the direction of the substantive relationship.

A final approach regresses the 2010 adoption levels (shown in Table 6) on the social capital/trust measure, as well as the other control variables and on the lagged variable of 2000 adoption levels. The results provide further evidence of the difference in the effects of social capital in the two time periods. In predicting the 2000 adoption levels, social capital/trust effects (not shown) are strong (b = −0.40; $p \leq 0.001$). Those 2000 social capital effects are contained in the 2000 lagged variable employed in the regression of the 2010 on it and social capital/trust. The lagged 2000 sustainability adoption variable has a significant effect on the 2010 adoption level (b = 0.68; p = ≤ 0.001), but the effect of the social capital/trust variable by itself diminishes to a non-significant level of b = 0.06. These results reinforce the suggestion that any social capital effects appearing in 2010 are likely contained in the 2000 patterns and that the change in 2010 is the result of forces other than social capital.

Table 6. Regression coefficient (b) of 2010 sustainability summary measure on 2000 sustainability measure with controls.

Control Variable	(b) 2000 Sustainability	(b) Control Variable
Social Capital	0.69 ***	0.05
Moralistic Culture	0.63 ***	0.07
Creative Culture	0.61 ***	0.07
Diversity	0.62 ***	−0.06
Inequality	0.61 ***	−0.09
Education (%Bachelors)	0.62 ***	0.12
Sea/Tsunami Vulnerability	0.68 ***	−0.01
Chemical Terror Vulnerability	0.67 ***	0.05
Transportation vulnerability	0.74 ***	0.21
Heat/Lighting Vulnerability	0.72 ***	0.18
Weather Vulnerability	0.67 ***	0.20

*** $p \leq 0.001$.

7. Discussion and Conclusion

Even when controlling for a wide variety of other variables, social capital has a significant effect on the adoption of city sustainability plans and policies in the year 2000. We suggest that this effect stemmed from the conjoining of the communitarian values, public goods nature of sustainability itself with the public goods, bridging values that grow out of higher levels of trust-based social capital. However, while there is considerable growth in sustainability plans and policies from 2000 to 2010, the effect of social capital on variations in that adoption actually declines considerably. Moreover, trust-based social capital reveals a *negative* effect on the absolute amount of change in adoption over that ten-year period. Thus, while we accept the hypothesis of change in the adoption of sustainability plans and policies, we also reject the hypothesis of no change in the effects of social capital on that adoption.

In the presence of a decline in the continued effect of social capital for new adoptions of sustainability plans and policies, as well as the generally insignificant impact of the multiple control variables, how, then, can one explain the significant increase in the presence of sustainability plans and policies across that period? We suggest the answer may be found in the influence of *isomorphic forces* generally unrelated to social capital at the local level [12]. In the context of those forces, our following discussion is intended to point the way toward additional research. Thus, isomorphism "…is a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" ([12], p. 149). Frederickson argues that "Isomorphism explains the pattern of increasing similarity, homogeneity, and congruence between and among organizations in similar fields…" ([85], p. 22). What are those isomorphic influences? They have been organized under three categories provided in the landmark essay by DiMaggio and Powell [12], namely coercive, mimetic and normative forces.

DiMaggio and Powell suggest "coercive isomorphism results from both formal and informal pressures exerted on organizations by other organizations upon which they are dependent" ([12], p. 150). One need not search far to discover sources of these coercive forces in recent developments in sustainability efforts, perhaps most strikingly in the financial incentives provided by numerous federal and state funding efforts related to sustainability, primarily in the environmental domain [86]. Mimetic isomorphism obtains in uncertainty, whereby the organization models a response based on other organizations [12]. Burress and Giblin write "…organizations seeking to change tend to choose from among the acceptable options. The result is that similar organizations within a common field (e.g., police departments) tend to resemble one another to the extent that organizational choices are constrained" ([87], pp. 6, 26). It is clear that there are numerous best practice models [88] after which an uncertain or inexperienced city could model its sustainability initiatives, such as the International City/County Management Association, and the National Association of Counties [89,90]. A normative isomorphic force "…stems primarily from professionalization" ([12], p. 152). Thus, the premier organization in public administration's (the American Society of Public Administration) 2013 annual conference is titled "Governance and Sustainability: Local Concerns, Global Challenges" [91]. The Urban Sustainability Directors Network (USDN) website describes their work this way: "Municipal government sustainability professionals from across North America came together in April 2009 to form USDN, a peer to peer professional network, to help each other find these win-win solutions.

USDN enables members to easily exchange information and collaborate to advance their practice. The result is that members are able to more quickly develop and share solutions that improve the natural and built environment, infrastructure, economy, health, and resilience of local communities" [92].

The research on which the present study is based underscores that the sources of policy adoption may be changing and dynamic across time. Particularly in the results shown here, one of the most important of the putative causes of sustainability initiatives (namely, social capital) exhibits very different effects early (2000) in their adoption among U.S. cities than in a subsequent period (2010). To our knowledge, this research is unique in addressing the role of social capital across time in a significant number of cities. The presence of many potential sustainability-related isomorphic forces in the last 10–15 years, when combined with this paper's reported results on correlates of change during the same period, suggest that additional work is to be undertaken. That additional work should address whether evidence can be found that ties the implementation of sustainability plans and policies in specific cities to specific coercive, normative and mimetic forces at work in those particular cities.

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Conflicts of Interest

The authors declare no conflict of interest.

Appendix

Table A1. Cities in the Study.

Cities in the Study	Survey Date	2000 Population	2000 Median Family Income **
1. Albuquerque	1996	730	48,300
2. Atlanta	1996	4,248	63,100
3. Baltimore	1996	2,553	63,100
4. Boston	1996	4,391	65,500
5. Charlotte	1996	1,330	57,100
6. Chicago	1996	9,098	67,900
7. Cincinnati	1996	2,010	57,800
8. Cleveland	1996	2,148	55,400
9. Colorado Springs	1996	537	51,300
10. Columbus	1996	1,613	57,300
11. Dallas	1997	5,162	60,800
12. Dayton	1996	848	55,900
13. Denver	1996	2,179	62,100
14. Des Moines	1993	481	60,000
15. Greensboro	1995	643	51,000
16. Hartford	1996	1,149	61,300
17. Houston	1996	4,715	56,700
18. Jacksonville	1996	1,123	51,400

Table A1. *Cont.*

Cities in the Study	Survey Date	2000 Population	2000 Median Family Income **
19. Kalamazoo	1995	315	50,300
20. Kansas City	1996	1,836	57,700
21. Knoxville	1996	616	48,700
22. Las Vegas	1996	1,376	50,700
23. Los Angeles	1996	12,366	52,100
24. Louisville	1996	1,162	51,500
25. Miami	1991	5,008	43,700
26. Minneapolis	1996	2,969	68,600
27. Nashville	1996	1,312	58,005
28. Oklahoma City	1997	1,095	44,100
29. Omaha	1996	767	58,600
30. Palm Springs	1994	43	45,318
31. Philadelphia	1996	5,687	57,800
32. Phoenix	1994	3,252	53,100
33. Pittsburgh	1995	2,431	44,600
34. Providence	1994	1,583	49,800
35. Reno	1995	343	57,300
36. Rochester	1996	1,038	52,400
37. Sacramento	1995	1,797	52,900
38. Salinas	1995	402	50,300
39. Salt Lake	1997	969	53,400
40. San Diego	1995	2,814	53,700
41. San Francisco	1996	4,214	74,900
42. San Luis Obispo	1994	247	48,000
43 .Seattle	1996	3,044	65,800
44. Spokane	1993	418	44,100
45. St. Louis	1996	2,699	56,500
46. Tulsa	1997	300	45,100
47. Washington, D.C.	1996	4,796	82,800
48. West Palm Beach	1994	82	56,600

* Population in thousands. Sources: [93,94]

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