USING A DELPHI METHOD TO DEVELOP CRITERIA FOR HIGH PERFORMANCE PUBLIC SPACES THAT CONTRIBUTE TO COMMUNITY SUSTAINABILITY

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1 ABSTRACT

The authors are conducting case study research to identify the factors that lead to the adoption of sustainable design practices in the planning and design of the public realm, resulting in the creation of High Performance Public Spaces (HPPSs). A HPPS is being defined as any publicly accessible outdoor and/or indoor space that generates economic, environmental, and social sustainability benefits for its community. The research is based on the Diffusion of Innovation Theory (DIT), which states that the diffusion and adoption of innovation is "a kind of universal process of social change" (Rogers, 2003, p.xvi). In order to select cases for research, the authors first needed to develop criteria to identify HPPSs. While sustainability indicator programs such as Leadership in Energy & Environmental Design (LEED) and Sustainable Sites Initiative (SITES) provided criteria for some dimensions of HPPSs, such as healthy ecosystems, the authors sought to develop criteria for a public space that generates the full array of economic, environmental, and social sustainability benefits. An initial set of 41 HPPS criteria was developed from a review of literature regarding great public spaces and sustainability indicators. The authors then employed a two-round Delphi method to review, refine, and develop 25 performance criteria for a HPPS. The resulting criteria were used to solicit, rank, and select three cases of HPPSs for further study into the factors that influence the adoption of sustainable design innovations in the planning and design of public spaces.

1.1 Keywords

sustainability, public spaces, diffusion of innovation, Delphi Method, indicators

2 INTRODUCTION

Over the past two decades, local communities in the United States have sought new ways to become more sustainable. One opportunity to improve a community's sustainability is through its 'parks and open space system', also known as its 'public realm'. The public realm generally refers to a community's system of streets and sidewalks, parks and civic spaces, historic and cultural areas, and natural areas and trails (Barth, 2013). It also includes public infrastructure such as drainage swales, stormwater treatment ponds, utility corridors and/or other lands owned and managed by city, county, regional, state and federal agencies. It is estimated that the public realm comprises as much as 25 – 50 percent of a community's land mass. Public rights-of-way alone can account for up to 35 percent of the developed lands in U.S. cities (Jacobs, 1993). A community's public realm can generate significant sustainability benefits: "parks and green belts can be framed as contributing to social sustainability (by providing access to spaces of recreation and social interaction), ecological sustainability (by setting aside green spaces and parks for carbon sequestration, habitat connectivity and species migration), and economic sustainability (by increasing property values of adjacent properties and neighborhoods" (Dooling, 2012, p.179). For the purposes of this study, a publicly accessible space that generates economic, environmental, and social sustainability benefits for their local community has been termed a High Performance Public Space (HPPS). A HPPS can be a park, trail, square, green, natural area, plaza or any other element of the public realm that generates all three types of benefits.

This study explores the reasons why some public space planning and design teams (including public agency staff and consultants) adopt sustainable design innovations in the planning and design process to create HPPSs, while others don't. More specifically, this study seeks to identify the key factors that influence the adoption of sustainable design practices in the planning and

design of public spaces. Sustainability researchers note that "what's missing from the [sustainability] literature is analysis and evaluation of why some local governments adopt sustainability principles into their policy-making process and why these policies work in some places as opposed to others" (Saha, 2009, p.18).

In order to research the factors that lead to the adoption of sustainable design innovations in the planning and design of public spaces, criteria had to be developed to identify cases of HPPSs for study. Current sustainability indicator programs such as Leadership in Energy & Environmental Design (LEED) (http://www.usgbc.org) and Sustainable Sites Initiative (SITES) (http://www.sustainablesites.org) provide criteria for some dimensions of HPPSs, such as healthy ecosystems. However the authors sought to develop criteria for the full array of economic, environmental, and social sustainability benefits that define a HPPS. Therefore the authors used a Delphi method to develop consensus for such criteria in order to identify cases of HPPSs for further study.

3 RESEARCH DESIGN, DATA AND METHODS

The Delphi method is an "iterative process to collect and distill the anonymous judgments of experts using a series of data collection and analysis techniques interspersed with feedback. The Delphi method is well-suited as a research instrument when there is incomplete knowledge about a problem or phenomenon" (Skulmoski et al., 2007, p.1). According to the RAND Corporation, the Delphi method was developed in the 1950s to forecast the impact of technology on warfare: "The method entails a group of experts who anonymously reply to questionnaires and subsequently receive feedback in the form of a statistical representation of the 'group response,' after which the process repeats itself. The goal is to reduce the range of responses and arrive at something closer to expert consensus" (http://www.rand.org/topics/delphi-method.html).

Delphi methods have been used for a variety of research projects, including national park selection criteria, taxonomy of organizational mechanisms, and ranking of personnel characteristics (Skulmoski et al., 2007). Delphi methods have also been used for sustainability- related research projects such as developing a framework for apprising the indicators of sustainable construction (Huang and Hsu, 2011).

The typical Delphi process for graduate students' research projects involve from as few as three to over 170 participants, and from one to three 'rounds' of feedback (Skulmoski et al., 2007). Typical steps in the process include:

1. develop the research questions,
2. design the research,
3. research sample [participants],
4. develop Delphi round one questionnaire,
5. Delphi pilot study,
6. release and analyze round one questionnaire,
7. develop round two questionnaire,
8. release and analyze round two questionnaire,
9. develop round three questionnaire,
10. release and analyze round three questionnaire [if required], and
11. verify, generalize and document research results [if required] (Skulmoski et al., 2007, p.6).

The research question for this study was "What criteria should be used to identify High Performance Public Spaces?" A literature review was conducted to develop initial criteria for review. The literature review focused on two areas of research related to HPPSs: characteristics of great public spaces and indicators of sustainable development.

The authors and other faculty members identified over 40 public space or sustainability experts (including academics, consultants, researchers, and public/ non-profit agency staff) to participate in the Delphi process; 21 experts agreed to participate.

In the first round of the Delphi method, participants were e-mailed the findings from the literature review and the resultant initial criteria. They were asked to delete any criterion that they believed to be irrelevant in identifying a HPPS; add any new criteria that they believed necessary to identify a HPPS; and revise any criteria to clarify meaning or intent. The authors compiled the results, which resulted in an expanded list of 46 criteria.

The purpose of the second round was to prioritize and reduce the number of criteria. Participants were e-mailed the expanded list from round one and asked to select and highlight their top five criteria within each category (economic, social, environmental) for a total of 15 criteria; rank and number each of the criteria from 1 – 5 (1 being the highest priority, 5 being the lowest) within each category; and revise any of their 15 selected criteria if necessary to clarify meaning or intent.

The list of criteria was included in surveys sent to City/County Managers and Parks and Recreation Directors throughout Florida, asking

them to identify HPPSs that met these criteria. Of the more than 30 spaces identified, the five highest scoring spaces were selected for further study.
The purpose of future study is to identify the factors that influence the adoption of sustainable design into the planning and design of HPPSs.

4 INITIAL CRITERIA

4.1 Characteristics of Great Public Spaces

The concept of harnessing the power of parks, streets, and other elements of the public realm to create more livable and sustainable communities in the United States is not a new idea. Yet over the span of a little more than 150 years, the concept has been sequentially embraced, practically forgotten, and recently re-discovered.
Since evolving from the sanitary reform movement in the mid-19th century (Peterson, 2003), parks and public spaces have consistently been planned and designed to respond to the social, economic and (more recently) environmental needs of an urbanizing society (Cranz, 1982; Cranz and Boland, 2004). In that time it is estimated that over 100,000 parks have been constructed in the U.S., managed by over 12,000 agencies (nrpa.org). These parks and public spaces have been credited with generating such social benefits as instilling discipline and values, reducing crime, and improving health and vigor (Peterson, 2003); providing places for people to meet, exchange information, attend events, conduct business, and move about the community (Gehl, 2011); and providing wholesome, safe activities for families (Putnam, 2000). They have generated ecological benefits by cleansing the air (Girling and Kellett, 2005; Peterson, 2003), protecting water quality, preserving natural scenery (Girling and Kellett, 2005; Scott, 1969), and providing wildlife habitat (Garvin, 2000). Plus, they have generated economic benefits such as increasing property values, providing jobs, and improving neighborhoods (Crompton, 2000; Garvin, 2000). Parks and public spaces are also credited with creating order, controlling land use, and shaping civic form and beauty (Cranz, 1982). Frederick Law Olmstead wrote extensively on the benefits of parks including their "soothing influence" on weary city dwellers, their role as a meeting ground for a democratic society, and their ability to foster "communicative associations – what today is often called social capital" (Low et al., p.209).
Characteristics of these public spaces include a unique sense of place; a variety of uses and things for people to do; low maintenance plantings and hardscape materials; positive impacts to surrounding uses; connectivity via greenways and boulevards; adequate drainage and sanitation; and meeting users' social and psychological needs (Jacobs, 1993; Van der Ryn and Calthorpe, 1986; www.olmsted.org). Great public spaces also have adequate sitting space, moveable tables and chairs, access to the sun, protection from the wind, trees, water that is "accessible, touchable, and splashable," food, a relationship to the street, access for the disabled, and other amenities such as bicycle parking, drinking fountains, game tables, artwork, play equipment, fountains, open air cafés and kiosks (Whyte, 1980).
Additional, more recent characteristics include self-sufficiency of resources and maintenance; solving larger urban problems outside of park boundaries; and adopting new standards for aesthetics and landscape management (Cranz and Boland, 2004). The Project for Public Spaces (PPS) summarizes the characteristics into the categories of access and linkages; comfort and image; uses and activities; and sociability (pps.org).
The 2010 *High Performance Landscape Guidelines: 21st Century Parks for NYC* represents one of the most recent efforts to integrate elements of sustainability into the characteristics of great public spaces. Guidelines include *Design* (engage all users, engage nature, and respond to site context); *Ecology* (support ecological function, and increase diversity and interconnectivity); *Economy* (resiliency, performance); and *Society* (collaboration and participation, public health, education, and long-term\ thinking) (Design Trust for Public Space, 2010).

4.2 Indicators of Sustainable Development

Sustainable Development Indicators (SDIs) are another source of potential criteria for HPPSs. SDIs are tools to measure and monitor progress towards sustainability goals (Rydin et al., 2003; Cox et al., 2002). According to the "Community Indicators Handbook" (Redefining Progress, 1997), local economic and social indicators projects in the U.S. were first developed by planning departments in the 1970s but had faded away by the early 1980s. SDIs re-emerged as a central component of the international sustainability movement in the 1990s; the United Nations *Agenda 21* called on communities to develop SDIs that "can provide solid bases for decision-making at all levels and contribute to a self-regulating sustainability of integrated

environment and development systems" (UM, 1992; UN DESA, 2001; Monssen, 2005) (Chai, 2009, p.120).

Currently there are no nationally or internationally agreed-upon SDIs to help measure and monitor progress towards sustainability (http://sustainabledevelopment.un.org/). However there are numerous sources of indicators that can be used as a basis for HPPS criteria. For example as mentioned above, indicator initiatives such as LEED, SITES, and the Landscape Architecture Foundation Case Study Initiatives (CSIs) (https://lafoundation.org/) have established common indicators to measure the sustainability performance of the built environment. Many local agencies have also developed their own SDIs to promote more sustainable development at the local level (Astleithner and Hamedinger, 2003; Saha, 2009). Initially developed as purely quantitative, technical measures of sustainable development, they now also include "soft outcomes such as capacity building and empowerment" (Holman, 2009, p.371). Recent indicator projects also take a qualitative as well as a quantitative approach in order to capture the less well-defined dimensions of community sustainability, such as quality of life, social interaction and community resilience (Bell and Morse, 2001; Scerri and James, 2010). The broader qualitative approach also helps to include people who have historically been disenfranchised and excluded from decision-making processes (McAlpine and Birnie, 2005). Most recently the United Nations System Task Team on the Post-2015 UN Development Agenda outlined a comprehensive vision for sustainable communities in Realizing the Future We Want for All, their June 2012 report to the Secretary-General. The vision included general indicators for each of the four core dimensions of Inclusive Social Development, Environmental Sustainability, Inclusive Economic Development, and Peace and Security (Post-2015 UN Development Agenda, 2012).

5 FINDINGS: CRITERIA FOR HIGH PERFORMANCE PUBLIC SPACES

An initial list of 41 potential HPPS criteria was developed from the literature review of the characteristics of great public spaces and indicators of sustainable development. The initial criteria were refined through the two rounds of the Delphi process, resulting in the following list of 25 criteria to identify High Performance Public Spaces:

Economic Criteria:

- The space creates and facilitates revenue-generating opportunities for the public and/or the private sectors.
- The space creates meaningful and desirable employment.
- The space indirectly creates or sustains good, living wage jobs.
- The space sustains or increases property values.
- The space catalyzes infill development and/or the re-use of obsolete or under-used buildings or spaces.
- The space attracts new residents.
- The space attracts new businesses.
- The space generates increased business and tax revenues.
- The space optimizes operations and maintenance costs (compared to other similar spaces).

Environmental Criteria:

- The space uses energy, water, and material resources efficiently.
- The space improves water quality of both surface and ground water.
- The space serves as a net carbon sink.
- The space enhances, preserves, promotes, or contributes to biological diversity.
- Hardscape materials are selected based on longevity of service, social/ cultural/ historical sustainability, regional availability, low carbon footprint and/or other related criteria.
- The space provides opportunities to enhance environmental awareness and knowledge.
- The space serves as an interconnected node within larger scale ecological corridors and natural habitat.

Social Criteria:

- The space improves the neighborhood.
- The space improves social and physical mobility through multi-modal connectivity – auto, transit, bike, pedestrian.
- The space encourages the health and fitness of residents and visitors.
- The space provides relief from urban congestion and stressors such as social confrontation, noise pollution, and air pollution.
- The space provides places for formal and informal social gathering, art, performances, and community or civic events.
- The space provides opportunities for individual, group, passive and active recreation.
- The space facilitates shared experiences among different groups of people.

- The space attracts diverse populations.
- The space promotes creative and constructive social interaction.

The list of criteria was included in surveys sent to City/County Managers and Parks and Recreation Directors throughout Florida, asking them to identify HPPSs that met these criteria. Of the 34 nominations received, 13 were self- scored by the nominees as meeting 80% or more of the HPPS criteria. Field visits and interviews were conducted for the five top-scoring cases, and the nominations were re-scored by the researcher based on the findings. The three top-ranked cases were selected to study the factors that influenced the adoption of sustainable design innovations in the planning and design process of each of the cases.

6 CONCLUSIONS

The Delphi method is an effective and efficient means of building consensus regarding a previously undefined concept. Some keys to conducting an effective Delphi method include the development of a clear research question; the creation of short, succinct questionnaires and exercises for each round, accompanied by well-grounded research for reference; and the selection of a cross section of highly qualified participants. Some participants may express concern regarding the time required to participate in the process, so researchers should strive to make the process as convenient as possible. The use of digital methods such as e-mail, word processing, and cloud-based file storage can simply the process; most participants reported that each round only required 15 – 30 minutes of their time.

The HPPS criteria developed through the Delphi method could be used by community leaders, public agency staff, planning and design consultants, community activists, and/or others interested in generating the most benefits from the public realm. There is little question that High Performance Public Spaces can make a significant contribution to a community's economic, social, and environmental sustainability. Diffusion and adoption of the findings from this study may increase the probability that more public spaces will be designed as High Performance Public Spaces.

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