Sustainability Planning and its Role in Creating Capacity for Learning: a Complex Adaptive System Perspective

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Abstract

Collaborative sustainability planning is seen as an effective tool in translating the concept of sustainable development into practice at the level of communities. It is widely endorsed by international organizations under headlines such as Local Agenda 21, Healthy Cities, Green Cities etc. The guidelines for such planning initiatives commonly emphasize a necessary long-term, systems perspective in problem definitions and suggested solutions. Although they build on traditional strategic management concepts, such planning processes are claimed to have their strength in using input from a diversity of local actors including both public and private sector representatives. Bringing together stakeholders, bridging their perspectives and networking their efforts are believed to provide the basis for the successful implementation of local sustainability strategies.

Most assessment approaches of such sustainability planning initiatives, however, usually focus on the output of these processes such as plans and formal strategies. While the role of change in attitudes, values and patterns of behavior is understood as a crucial element in progressing toward a more sustainable local community, such changes are implicitly assumed to take place as a result of the collaborative planning effort and are not directly assessed. In my paper, I will argue that accounting for these *tacit* aspects could build on the notion of *learning* and the collection of actors involved in planning can be analyzed as a *complex adaptive system (CAS)*. Using CAS as a theoretical framework can contribute to the assessment of the change in the interactions among actors and their behavior, knowledge generation and how these enhance the emergence of capacities necessary to cope with the 'wicked' problem of sustainability at the community level.

The paper represents preliminary theoretical work for an empirical research project forming the background of my doctoral dissertation

Keywords: sustainability planning; complex adaptive systems; organizational learning; assessment

Introduction

My paper tries to reveal how a Complex Adaptive System (CAS) perspective can serve to explore the changes that take place within communities aspiring to become "sustainable communities" as a result of introducing new forms of environmental governance, such as sustainability planning. While the concept of learning and adaptation has been applied to organizational change in business situations quite extensively, public or inter-sectoral contexts have rarely been considered in detail. I suggest that "sustainable communities" should be viewed as communities capable of learning to tackle problems associated with sustainability, or rather: unsustainability.

In my paper I will argue that the CAS framework can be used effectively for assessing how local sustainability measures contribute to the adaptive or learning capacity of the community, which leads to self-organization within the community and creates innovative emergent strategies, as a sign of improved policy performance.

Sustainability

Over the past few decades concerns regarding the rate of growth of economic activities and their impacts on the natural environment have led to extensive discourse in a wide array of disciplines. Among the countless new discoveries and ideas, the concept of sustainability has probably been one of the greatest 'success' in terms of fertilizing academic research in many areas and mobilizing for action in practice at all levels of society from local to global. The popularization of the concept probably owes much to the development of systems thinking and *vice versa*. The much cited report of the Club of Rome (Meadows and Club of Rome., 1972), besides its explicit message about the possible alternative futures of the planet, also delivered to a greater audience a new way of thinking about real-world phenomena, which transcend the boundaries of traditional disciplines and jurisdictions of actors in the social world. This fact manifests itself in many normative definitions of sustainability calling for cross-sectoral and integrated approaches in seeking solutions.

The need for a different perspective for development, which is *compatible* with sustainability also emerged at the local level. Agenda 21 carries the proposition that development will not be environmentally, economically and socially sustainable without the active participation of local communities. The visionary image of sustainable communities provided impetus for international movements such as Local Agenda 21 (LA21), Healthy Cities and fertilized professional fields such as environmental management and urban planning. A wide array of tools has been developed and is used by local authorities to implement sustainability. By selecting an appropriate portfolio of these, local authorities are expected to use a strategic approach in steering local communities toward community goals. These initiatives marked the beginning of a new era in environmental decision-making through advocating for tighter integration with other sectoral policies and more extensive stake-holder participation. The adoption of new practices in governance however may not happen instantly due to the inertia maintained by institutional and political conditions. Moreover, success is widely believed to be a function of changes in the attitudes, underlying beliefs and values of the local actors.

Sustainable Communities

Accounts of sustainable communities often give the impression of being the "holy grail" of environmental policy. Mazmanian and Kraft's (1999) overview of the evolution of modern environmental policy for instance culminates in the "epoch" of sustainable communities. They argue that "linking sustainability concepts and concepts of community has particular advantages, since communities represent the social and physical expression of interdependencies." Compared to earlier eras of environmental policy, environmental problems in this epoch are defined in more systemic terms, revealing their complex interdependencies with societal and economic phenomena. Objectives are sought to be balanced both across these domains and over time. Balancing requires integrative, strategic policy responses, which include systematic problem analysis, planning, implementation and evaluation. The emphasis shifts from top-down hierarchical (vertical) control over to networking (horizontal collaboration) between players in the policy process as a result of the redefinition of the relation between the state, markets and civil society (Mol and Van den

Burg, 2004). Satterthwaite (1999) speaking of "sustainable cities" notes that:

> …no clear, agreed definition as to what the terms 'sustainable cities' and 'sustainable human settlements' mean. Such a diverse range of environmental, economic, social, political, demographic, institutional and cultural goals have been said to be part of 'sustainable development' that most governments or international agencies can characterize some of what they do as contributing to sustainable development. (Satterthwaite, 1999)

Roseland (1994) in his overview of the sustainable community literature also describes many variations for the theme including green cities, eco-cities, livable cities, eco-communities and sustainable cities. The ten different streams identified are traceable to a number of intellectual backgrounds ranging from planning through architecture to bioregionalism. However, these streams are not 'air-tight'. There is some overlap in these approaches and thus the boundaries are sometimes difficult to reveal due to conceptual convergence in cases.

Out of the recognized streams of the sustainable community literature, the one rooted in planning and management has succeeded in developing a strong research agenda on aspects of practical implementation of sustainability (Keysar, 2005). In this stream, sustainable communities are associated with local authorities developing strategies for sustainability. Luhde-Thompson (2004), who puts it as follows:

> The art of 'governing sustainable cities' is thus to create competent local governments that, in interaction with a highly responsible and responsive civil society, apply a form of governing that brings about the most sustainable solutions. (Luhde-Thompson, 2004)

Whitehead (2003) traces the international expansion of the ideal of sustainable cities to the concept of sustainable urban development appearing in several international policy documents dating back to as early as 1972, including Agenda 21 quoted above. He also articulates two concerns regarding conceptualizations of the sustainable city: (1) most approaches tend to be technocratic interpretations of procedures of implementing sustainable urban development, (2) they identify the sustainable city as an ontologically pre-given entity. The two are interrelated in the sense, that if sustainable cities are a final object (a set of achievable goals), then a thoughtfully designed and implemented course of interventions may help progress toward the axiomatic sustainable city or more generally: a sustainable community. The Institute of Sustainable Communities (ISC) definition of *sustainable communities* is phrased as follows:

> Sustainable communities are defined as towns and cities that have taken steps to remain healthy over the long term. Sustainable communities have a strong sense of place. They have a vision that is embraced and actively promoted by all of the key sectors of society, including businesses, disadvantaged groups, environmentalists, civic associations, government agencies, and religious organizations. They are places that build on their assets and dare to be innovative. These communities value healthy ecosystems, use resources efficiently, and actively seek to retain and enhance a locally based economy. There is a pervasive volunteer spirit that is rewarded by concrete results. Partnerships between and among government, the business sector, and nonprofit organizations are common. Public debate in these communities is engaging, inclusive, and constructive. Unlike traditional community development approaches, sustainability strategies emphasize: the whole community (instead of just disadvantaged neighborhoods); ecosystem protection; meaningful and broad-based citizen participation; and economic self-reliance. (Institute for Sustainable Communites, 2006)

The above definition combines at least two different understandings of what constitute sustainable communities. On the one hand it briefly considers an ecological economic aspect referring to healthy ecosystems and efficient resource usage. On the other hand it has an *action* perspective, which recognizes sustainable communities as a collection of qualitatively new *strategies* for managing urban problems.

Local authorities are well-situated for acting as 'champions' in developing strategies as they are typically in charge of development and land-use policies and authorization, local budgets and spending and they also carry the potential of networking local players, such as authorities, non-profits, firms and citizen groups. Also typically being large purchasers and consumers of products and services, their sustainability-oriented practices may contribute to desirable change in local sustainability conditions.

Planning for Sustainable Communities as Strategies for Learning

Somewhat paradoxically, local planning and management strategies to handle the dynamic and complex issues associated with sustainability are often originally designed for simple problem scenarios and expected to work reasonably well in complex situations. Meppem and Gill (1998) point out that "traditional development planning is driven by the need to achieve a pre-determined goal that requires adaptation to a given environment." Decision makers in this context manipulate negative feedback (through planning, monitoring, reviewing and taking corrective action) in an attempt to produce patterns of behavior consistent with stability and equilibrium. In the case of sustainability planning, however, the lack of complete information and certainty precludes mechanistic control. In situations like this, problem-solving strategies, which are interactive and which generate information are desirable to encourage innovation and institutional change through the learning and adaptation of parties involved in the planning process.

According to this interpretation, sustainability planning (and other sustainable community strategies), has to be seen as a vehicle for facilitating learning rather than a means of achieving any given state. "Here, learning refers to the accumulation of insights into system cause and effect by all those with interest in a decision or issue." (Meppem and Gill, 1998).

Fiorino (2001) in his overview of changes in environmental policy also draws on the notion of *learning*, although using it more as a retrospective explanatory framework. Policy changes in this approach are attributed to knowledge acquisition and utilization as opposed to traditional models of policy change that focus on pressures and conflicts. Fiorino (2001) describes three types of learning: (1) technical, (2) conceptual, and (3) social learning. *Technical learning* is associated with emphasis on finding new policy instruments in the context of fixed policy objectives. Change occurs without the reconsideration of objectives and strategies. Policy makers respond to demands of change with "more of the same" instruments adopted earlier for environmental problems. *Conceptual learning* takes place when policy definitions are modified and policy goals and strategies are debated and get adjusted. As a result, new concepts enter the lexicon of policy discourse, such as 'sustainability'. *Social learning* is identified as growing emphasis on the interactions and communication of actors involved in the policy process. It builds on both technical and conceptual learning, but places policy into a greater social context.

The general message about desired directions in environmental policy-making (and strategy formulation) suggests that the traditional positivist approach, which relies on notions of controllable mechanisms and equilibrium is not appropriate in an increasingly complex and dynamic world (Funtowicz et al., 1999). Ideally policy systems, such as "sustainable communities", with greater capacity for *learning* recognize the inherent uncertainty in environmental problem situations and for this reason develop flexibility through being structurally open and cooperative. This also has implications for the evaluation of local sustainability strategies. As opposed to traditional assessment approaches of local sustainability strategies, which solely focus on *content*, *processes* should also be taken into account. A key measure of progress in this context becomes the maintenance of a creative learning framework for sustainability (Meppem and Gill, 1998).

As an example, Gardner's (1988) criteria for sustainability assessment combine aspects consistent with the learning perspective. A subset of criteria

is dedicated to *adaptivity*. Strategies are expected to be experimental, responsive, anticipatory, dealing with uncertainty and maintaining diversity and options for resilience. Devuyst (2001) argues that Gardner's criteria can form the basis of more advanced and detailed assessment frameworks. As a matter of fact, the assessment of policies, plans, programs and projects rarely include an in-depth consideration of these aspects. The performance of strategies is assessed through the static (usually one-off) observation of certain characteristics. Learning and adaptivity, however, are dynamic phenomena, which require longitudinal observation of how strategies (such as sustainability planning) lead to different patterns of behavior within the policy system.

Innes and Booher (1999) differentiates between first, second and third order effects of collaborative planning to account for indirect and intangible products of the planning process. In addition to products such as plans, agreements, new relationships, mutual understanding, shared problem frames, change in perceptions and practices, new norms and heuristics, innovative strategies should also be considered as the results of 'successful' planning. These effects ideally extend into the community and trigger self-organizing activities, which lead to practices that are flexible and networked, permitting the community to be more responsive to change and conflict.

Limitations of Current Assessment Approaches to Sustainability Planning

Assessment of sustainable communities, based on strategic planning approach, is most often interpreted as the assessment of the sustainability strategies that communities have adopted and not the sustainability of the communities *per se*.

Surprisingly little attention is dedicated to the understanding of these *strategies* from a social science point of view (Whitehead, 2003), although the underlying forces that lead to new emergent and formal strategic behavior, such as the value orientation and knowledge of agencies are considered critical for performance in public administration theory as well (Rhodes and MacKechnie, 2003).

The relationship between values, beliefs, knowledge and strategies have not been thoroughly investigated in the reverse direction either. The claims that these strategic processes for sustainability really lead to lasting and profound changes in policy and underlying behavior have not been verified (Selman, 1998).

Assessment approaches are based on the assumption that if certain elements of the *process* exhibit these characteristics, then it is effective in creating the innovative outcomes which contribute to better performance. In Minzbergian (1998) terms, what is being assessed usually is *intended* strategy and not the *emergent* one. This is clearly a result of formal strategies being more apparent and accessible to research as there is information available in *artifacts,* such as formal documents (e.g. planning documents), and other forms of communication (e.g. sustainability indicator reports). In the language of organizational learning, evidence of single-loop learning may be readily available as opposed to that of double-loop learning, which requires different analytical tools, and therefore shifts in underlying *schemas* are left to be inferred.

A Complex Adaptive System Perspective for Sustainability Planning

Most research efforts assessing sustainability strategies (including planning) take a 'snapshot' of local authorities and their partnership network. Although a qualitative change in decision-making is sought for, these assessment frameworks usually assume away the dynamic character of organizations. Instead of looking for shifting patterns in their behavior, they only infer change by checking whether they formally adopt certain environmental management tools (for instance they prepare a *plan*). I argue that these assessments miss the 'point' by failing to reveal generative processes, which underlie shifts (or the lack thereof) in the way local authorities and their service networks address issues of sustainability. Discussing organizational research on change, Van de Ven and Huber (1995) put it as follows:

> Theoretically sound and practically useful research should explore the context, content, and process of change, together with the interconnections of these contingencies through time. (Van de Ven and Huber, 1995)

In management and organizational research c*omplexity science* has been a promising direction for inquiry into organizational change and performance. (Allen and Strathern, 2003, Price, 2004). A common element of complexity science models is that they explicitly incorporate the dimensions of time, thus they are particularly attractive to studying organizational phenomena involving change with a focus on generative mechanisms responsible for change (Dooley, 2004).

Allen and Strathern (2003) describes complexity applied to organizations as providing "a new basis on which to consider the link between overall goals, desires, and motivations of people and organizations and the strategies and behavior that might help to bring them about."

From a complexity point of view, organizational change and performance need to be understood in systemic terms. In this context local authorities and stakeholders involved in participatory planning (strategy formulation) and action (strategy implementation) are interpreted as elements of a complex system. Complex systems are systems consisting of a large number of interconnected elements. The interconnections are nonlinear and dynamic (Lissack and Letiche, 2002). The complex structure of such systems display behavioral complexity, which makes prediction of future behavior extremely difficult, if possible at all. The most important of these behavioral characteristics are the sensitivity to initial conditions, the diversity of qualitatively different behaviors, self-organization, and emergence (Richardson, 2005).

An important area of research in complexity theory is the study of complex adaptive systems (CAS), which are systems of agents interacting with each other according to a set of rules or *schema* (Stacey, 1996). CAS exhibit learning and adaptability. In both organizational and CAS theory literature, it has been shown that the ability of agents to adapt to changing environmental conditions is crucial to the performance of the specific agent and of the system involving many agents (Rhodes and MacKechnie, 2003). In management theory terms, emergent strategies (which are a result of self-organization and are subject to continuous adaptive mechanisms) are likely to be more effective under conditions of uncertainty, than traditional intended strategies, which try to reduce or eliminate uncertainty (Downs et al., 2003).

CAS provide a meaningful theoretical framework for assessing local sustainability strategies as they offer building blocks which can be used to account for the aspects missing from traditional analyses (Innes and Booher, 1999). The purpose of assessment using the CAS perspective is not to evaluate whether certain policy measures (such as plans, projects) comply with sustainability principles, but it is to reveal how these measures increase the capacity to deal with environmental sustainability issues, which provide complex and uncertain conditions for decision-making (Meppem and Gill, 1998).

Interaction

A lot of emphasis is put on participatory processes in developing strategies for sustainability (see for instance ICLEI, 2002). Participation is seen as a vehicle for building consensus over development issues through surfacing potentially divergent values, interests and problem frames. The involvement of key stakeholders (individuals and organizations) also serves to enhance coordination in implementing strategies. The role of increased *social capital* is also often highlighted in the literature as a positive effect of participatory governance (Rydin and Pennington, 2000,

Rydin and Holman, 2004).

However strong the emphasis on participatory models in decision making, surprisingly little attention is directed toward confirming that participation3€ beyond the appealing democratic merits3€ does in fact contribute to substantial change within local policy systems and create spill-over effects, such as increased knowledge and trust and qualitatively different behavior over time. The CAS perspective, by default, puts interactions into spotlight. Local players involved in the formulation and implementation of strategies and even those, which are not formally identified as partners, are represented as can be represented as *agents* in a CAS at one level of analysis. The performance of local sustainability strategies will be an emergent pattern of interactions between the agents in the network studied over time. While traditional assessment methods grasp formally prescribed networks ('partnerships'), the CAS framework should also consider self-organizing relationships as well, which may differ considerably from prescribed ones (Tichy and Fombrun, 1979).

Knowledge

The role of information (both technical and contextual) is also emphasized for local sustainability strategies. For instance sustainability indicators, as part of the planning cycle, are seen as crucial tools for providing feedback to decision-makers and the entire community. Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) are also mechanisms, which gather information to be used as input in decision-making. They also serve as vehicles of learning: they are expected to facilitate the development of preferences, involve political discussions and generate knowledge throughout the whole decision-making process (Devuyst, 2001).

In the organizational learning literature, knowledge creation is believed critical for firms to keep their competitive advantage (Un and Cuervo-Cazurra, 2004). In the context of public sector, knowledge creation can be crucial in delivering improving services whether by a single agency or a network of players (Boyne and Walker, 2004). Sustainability planning, which involves such a network of players can be interpreted within the CAS framework as distributed knowledge systems. Knowledge in CAS is not understood as a static stock of retrievable information and data. Knowledge manifests itself in patterns of behavior of the CAS agents. The knowledge that agents transit to each other become shared *routines*, which are repetitive patterns of activity that underpin and control the smooth functioning of the policy network. Change emerges from the cumulative interaction among these routines. The CAS framework can account for the changes in knowledge through studying the *variation* and *selection* of agent strategies. When selection leads to improvement to some measure of success, adaptation occurs (Axelrod and Cohen, 1999). For sustainability planning knowledge creation and diffusion implies that agencies, organizations and other actors involved in the process of strategy formulation and implementation will ideally exhibit a converging stance on common goals at a network level, and will also employ strategies consistent with those goals.

Concluding Reflections

Participatory approaches in formulating and implementing strategies have become popular in many different policy contexts. Environmental decision-making and sustainability planning are good examples. The literature on sustainability planning emphasizes solutions, which account for the interconnectedness and dynamic character of issues including ecological, social and economic considerations. Ironically, the assessment of such planning initiatives is usually limited to the static observation of the outcomes of planning assuming away changes over time. A complex adaptive system perspective, however, can provide the insights, which complement traditional assessment approaches. They can be particularly effective in exploring self-organizing processes, which are triggered (or left untriggered) by sustainability planning. These include changing interaction patterns between players and the creation of knowledge relevant for better systemic performance and progress toward a more sustainable community.

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