Perspectives on Organizational Change: Systems and Complexity Theories

Francis Amagoh
Department of Public Administration
Kazakhstan Institute of Management, Economics and Strategic Research (KIMEP)
Almaty

Famagoh@Kimep.Kz
OR
famagoh@excite.com

Abstract

It is becoming increasingly important for organizations to gain competitive advantage by being able to manage and survive change. This paper presents two theoretical paradigms (systems and complexity theories) through which organizational change processes can be fruitfully examined. Systems and complexity theories are two valuable perspectives that can equip organizational leaders with the requisite knowledge and understanding of how to respond and adapt to the uncertainties and demands of global change. These two paradigms are particularly useful in the areas of organizational intelligence, organizational design, knowledge management, and corporate strategy, to mention but a few.

Key Words: Systems Theory, Complexity Theory, Organizational Change, And Organizational Transformation

Introduction

The ability of organizations to manage and survive change is becoming increasingly important in an environment where competition and globalization of markets are ever intensifying (Cao and McHugh, 2005: 475). Through the mid-20th century, there had been increased attempts to apply theories of organizational change to the analysis of human organizations (Byeon, 2005: 223). The first attempt, which applied concepts of systems theory was mainly concerned with equilibrium and stability, and their maintenance through control of negative feedback (Montuori, 2000: 66; Byeon, 2005: 223; Foster, 2005: 877). The systems concept views organizations as constantly interacting with their environment. The organizational environment is comprised of a set of relationships between agents or stakeholders and other factors that may be beyond the control of the organization (Mason, 2007: 10). With the ever-increasing complexity of the organizational environment, the systems concepts no longer seems adequate in dealing with complex phenomena. This shortcoming, among others, has led to the emergence of complexity theory which focuses on the use of such terms as entropy, non-equilibrium, instability, and the emergence of new patterns and structures. In the complexity paradigm, systems are usually considered to be evolving or self-organizing into something new (Ferlie, 2007: 155; Byeon, 2005: 226; White, 2000: 167).

Since the most prevalent trends in contemporary organizations are towards continuous and pervasive change and increasing interdependencies (White, 2000: 162), close parallels can be drawn between the private and public sectors where there are broadly similar environmental challenges. Within this context, public and private organizations are approaching a turbulent environment characterized by increasing uncertainties. These uncertainties are due to dramatic changes that have taken place in the political and economic environment, as well as changes in technology. To help understand change better and manage the process more effectively, a more dynamic and comprehensive view of change management has been suggested as a way forward (Cao and McHugh, 2005: 480). By integrating complexity and systems theories, the disruptive, and fluid processes of organizational change may be better understood (Styhre, 2002: 343).

This paper presents organizational change through the perspectives of systems and complexity theories, and underscores that an appreciation of these two paradigms can aid organizational leaders in responding more effectively to the environmental uncertainties of contemporary organizations. It begins with a review of systems and complexity theories, followed by implications of both theories for organizations.

Systems Theory

Systems theory is a concept that originated from biology, economics, and engineering, which explores principles and laws that can be generalized across various systems (Yoon and Kuchinke, 2005: 15; Alter, 2007: 35; Dubrovsky, 2004: 112). A system is a set of two or more elements where: the behavior of each element has an effect on the behavior of the whole; the behavior of the elements and their effects on the whole are interdependent; and while subgroups of the elements all have an effect on the behavior of the whole, none has an independent effect on it (Skyttner, 1996: 7). In other words, a system comprises of subsystems whose inter-relationships and interdependence move toward equilibrium within the larger system (Martinelli, 2001: 73; Steele, 2003: 2).

The concept of general systems theory (GST) was first advanced by Ludwig von Bertanlanffy in 1940 but did not gain prominence until the 1960's. GST is primarily concerned with how systems operate, and integrates a broad range of systems by naming and identifying patterns and processes common to all of them (Bausch, 2002: 421; Capps and Hazen, 2002: 309). By use of such an overarching terminology, GST tries to explain the origin, stability, and evolution of all systems (Alter, 2007: 36; Montuori, 2000: 65). An important aspect of GST is the distinction between open and closed systems. All conventional models and theories of organizations typically embraced the closed systems approach to the study of organizations by assuming that the main features of an organization are its internal elements. While closed systems approach consider the external environment and the organization's interaction with it, to be for the most part inconsequential, open systems approach views the organizations' interaction with the external environment as vital for organizational survival and success. In open systems, any change in any elements of the system causes changes in other elements (Shafritz and Russell, 2005: 241; Wang, 2004: 396). The lack of coordination between the organization and its external environment in closed systems inhibit the organization's capacity to import sufficient energy from its environment for sustenance.

Three major pioneers in GST are Kenneth Boulding, Daniel Katz, and Robert Kahn. According to Boulding (1956: 203), GST studies all thinkable relationships abstracted from any concrete situation or body of empirical knowledge. In his hierarchical framework of systems, Kenneth Boulding arranged systems in a hierarchy of complexity (Martinelli, 2001: 74; Bausch, 2002: 418, Stewart and Ayres, 2001: 83). The hierarchical approach classifies

systems into nine levels or entities according to increasing levels of complexity (Sullivan, 2004: 48; Yoon and Kuchinke, 2005: 17; Beeson and Davis, 2000: 182) for the purpose of studying their characteristics. Each new level brings in a different relation, or relation of a relation, as well as involving those at previous levels (Martinelli, 2001: 72). The nine levels of the hierarchical approach are as follows (Martinelli, 2001: 73; Ashmos and Huber, 1987: 609):

1. Static structure – It might be called the level of "frameworks." This is the geography and anatomy of the system (identification and relationship of parts).
2. Simple dynamic – basic motions of the system within its environment (movement of parts).
3. Self-regulated – the concept of control as a system (the idea of the thermostat).
4. Open – the system as a cell (the self-maintenance factor in living systems).
5. Genetic-societal – the plant as a system (pre-determined patterns of growth and decay).
6. Animal – animals as systems (increased mobility and self-awareness).
7. Human – the individual as a system (self-consciousness, learning, adaptation).
8. Social – the group or organization as a system (roles, perceptions, status, etc.).
9. Transcendental – absolutes and ultimates (the unknowns).

Boulding's general frameworks might be applied to managerial systems but keeping in mind that any level incorporates characteristics from all the previous levels (Martinelli, 2001: 77). Boulding also synthesized general systems theory into five basic premises (Schoderbek, 1971: 63):

1. Order, regularity, and non-randomness are preferable to lack of order, of regularity and to randomness.
2. Orderliness in the empirical world makes the world good, interesting, and attractive to systems theorists.
3. There is order in the orderliness of the external world (order to the second degree) – a law about laws.
4. To establish order, quantification and mathematics are highly valuable aids.
5. The search for order and law necessarily involves the quest for the empirical referents of this order and law.

Daniel Katz and Robert Kahn collaboratively viewed organizations as comprising of patterns of behavioral events. These patterns are interdependent, cyclical, consistent over time, and must be understood in terms of their interaction with each other, and with the external environment. They were the first to introduce the concept of input-throughput-output in describing organizational environments (Capps and Hazen, 2002: 311; Melcher, 1975: 104). In their 1966 work, Katz and Kahn identified the following nine characteristics of open systems as applied to organizations (Melcher, 1975:105; Katz and Kahn, 1966:88; Dubrovsky, 2004: 113) mostly having to do with energy exchanges in an open system. Indeed, Katz and Kahn summarize the idea of systems theory as a knowledge framework that focuses on structures, relationships, and interdependence between elements (Katz and Kahn, 1978: 27).

Since systems theory considers the input-throughput-output component and their interactions both within themselves and with the external environment, the elements of

purpose, people, structure, techniques and information must be coordinated and integrated by the managerial system, in order to maximize value for the organization (Randolph and Blackburn, 1989: 103; Montouri, 2000: 66). In open systems, the goal of transformation is to improve horizontal and vertical fit of the subsystems with each other, and within the organization. There must also be a fit between the organization and its external environment. For example, an organization will need information about certain characteristics of its tasks, its employees and its own structural features in order to fit its employees with the tasks they face in particular organizational positions (Fioretti and Visser, 2004: 16). Thus, in analyzing organizations, the open-systems approach investigates the repeated cycles of inputs, transformation, and output, which comprise organizational systems and subsystems (Yoon and Kuchinke, 2005:19; Stewart and Ayres, 2001: 85).

Two of systems theory's most significant concepts can be found in the classification-related characteristics of Boulding's hierarchical approach. First, since systems can be classified according to their common properties, this means that by knowing the class (e.g., organizations) to which a system belongs, one can know many of the system's properties (e.g. relatively stable distributions of hierarchical authority) without having to observe the system itself. Second, systems of any class possess not only the common properties of other systems at their level, but they also possess the properties of their component, lower-level systems, except as the properties of the components are modified through their relations with the whole (Ashmos and Huber, 1987: 615). Consequently, if something belongs to a particular system, such as the organization level, it has all the properties of organizations, and also, all the properties of lower-level systems (Martinelli, 2001: 77; Dubrovsky, 2004: 119; Sullivan, 2004: 50).

Critique of Systems Theory

Despite the potential benefits of systems theory, it does have its critics. According to Yoon and Kuchinke (2005: 16), the systems model does not specify when and how collaboration with the organization needs to take place, nor what to do when the analysis suggests that there are existing or potential conflicts between the organizational environment, work environment, work, and the structure of the organization. These are issues that relate to uncertainty and thus challenge the organization to identify appropriate responses. D.C. Phillips describes some of the shortcomings of systems theory as: the failure to specify precisely what is meant by a system; the vagueness over what is to be included within systems theory; and the weakness of the charges brought against the analytic or mechanistic method (Shrode and Voich 1974: 88). The systems concept assumes that the boundaries between the organization and its environment are distinct (Fioretti and Visser, 2004: 16) - however, Castells (1996: 167) cautions that differentiating boundaries and transformations are not always easy when organizations have multiple nodes of interactions and communication lines. Furthermore, in a rapidly changing environment where tasks and group compositions become intermingled, open-systems theory does not provide immediate answers to how organizations need to address such complex situations (Clippinger, 1999: 21). Consequently, the open-systems model needs to be modified in situations in which the velocity and range of choices overpower stability and predictability (Sullivan, 2004: 45; Wang, 2004: 395).

Critics of systems theory also argue that it gives little direct guidance as to which aspects of the systems of interest should be manipulated to achieve policy objectives. Systems theory does not appear to provide a way forward when constituents of a system are

in conflict with each other and/or are very ill matched in terms of power and resources (Stewart and Ayres, 2001: 82). Kast and Rosenzweig (1973: 57) identify four major weaknesses of systems theory. One of their major objections is the idea of comparing organizations to organisms as espoused in systems theory. Kast and Rosenzweig contend that we should be cautious in trying to make the analogy between living organisms and organizations too literal. In other words, organizations may be systems but not necessarily natural systems. Second, on the dichotomy between closed and open systems, they contend that there are difficulties in applying this strict polarization to social organizations. Most social organizations and their subsystems are "partially open" and "partially closed". Thus, "open" and "closed" are a matter of degree. Third, in the utilization of systems theory, Kast and Rosenzweig urge that we should be more precise in delineating the specific system under study by being more specific about the boundaries of the system under consideration and the level of our analysis. In fact, Alter (2007: 36) concurs on this shortcoming of systems theory, stating that one of the problems in trying to incorporate the GST ideas is that so many different systems come under the GST umbrella. Fourth, systems theory fails to recognize the fact that social organizations are contrived systems. With its predominant emphasis on natural organisms, general systems theory may understate some characteristics which are vital for social organizations. Social organizations do not occur naturally in nature, they are contrived by man. This means that they can be established for a variety of reasons and do not follow the life-cycle patterns of birth, growth, maturity, and death as biological systems (Kast and Rosenzweig, 1973: 58).

In their analysis of the systems concept, Ashmos and Huber (1987: 617) argue that though the open systems model has been widely used to label and legitimize organizational studies, it has been of little use as a research guide. In particular, although open systems have several properties that are important to organization research, very few organization studies have been guided by formal recognition of these properties as properties of open systems. The conspicuous exceptions are studies dealing with the sixth and eight of Katz and Kahn's (1966: 88) properties (information input and feedback, and differentiation). However, studies of information input and feedback (such as studies of organizational intelligence, boundary spanning, and adaptation) and studies of differentiation (such as studies of specialization and coordination or integration) undoubtedly would have been performed without formal use of the open system view. This implies that even though the term "systems theory" was not used prior to the widespread recognized application of the systems concept, organizational studies had always applied the systems approach in the analysis of public and private organizations.

Finally, Beeson and Davis (2000: 181) argue that the systems perspective, applied to organizations in its classic formulations fails to give a sufficient account of change. The emphasis on boundary, environment, feedback and adaptive response presumes that management is readily identified as the control center, which directs the organization's operations. Thus, the model attributes a central role to management and overestimates management's power to control events and actions. This produces an impression that organizational change must be managed, and that managers can always manage change.

Based on these criticisms, it seems attractive to consider a more transformational model of organizational change derived from the ideas of dynamic non-linear systems. The complexity and uncertainty of organizational change processes seem to be much better captured by complexity theory (Morel and Ramanujam, 1999: 278; Styhre, 2002: 345; Price, 2004: 42).

Complexity Theory

Complexity is defined as the measure of heterogeneity or diversity in internal and environmental factors such as departments, customers, suppliers, socio-politics and technology (Mason 2007: 10). Complexity theory focuses on how parts at a micro-level in a complex system affect emergent behavior and overall outcome at the macro-level (McElroy, 2000: 198; McKenzie and James, 2004: 35). It is concerned with the study of emergent order in what otherwise may be considered as very disorderly systems (Sherif, 2006: 73). As the complexity of a system increases, the ability to understand and use information to plan and predict becomes more difficult. Over time, the increasing complexity leads to more change within the system (Chakravarthy, 1997: 74). As the system becomes more complex, making sense of it becomes more difficult and adaptation to the changing environment becomes more problematic (Mason, 2007: 11; Cao and McHugh, 2005: 477). Complexity theory paradigm rejects the mechanical ontological models, which assume linear causality between events and effects (Styhre, 2002: 346; Ferlie, 2007: 156; Mason, 2007: 22). According to Rhee (2000: 488), the characteristic structural and behavioral patterns in a complex system are due to the interactions among the system's parts. Complex systems tend to be deterministic in nature and evolve through a phase of instability, which eventually reaches another threshold where a new relationship is established between its internal and external environments and itself (Sullivan, 2004: 46; McElroy, 2000: 197). Systems that operate near a threshold of instability tend to exhibit creativity and produce new and innovative behaviors at the level of the whole system (Price, 2004: 44; Styhre, 2002: 347).

Some proponents of complexity theory employ the concept of entropy. A simple definition for entropy is disorder. It is the tendency of a system to move toward a more random state in which there is no further potential for energy transformation or work (McKenzie and James, 2004: 33; Byeon, 2005: 224; Farazmand, 2003: 341). Entropy is the disorder, disorganization, lack of patterning, or randomness of organization of a system (Byeon, 2005: 224). According to Bailey (1990: 71), entropy has replaced the age of equilibrium. The concept of equilibrium as espoused in systems theory is not sufficient to fully describe the complexity of social phenomena. Complexity theory is able to grasp the dynamic processes of the generic entropy phenomena in organizations and society at large (McElroy, 2000: 198; Meek et al., 2007: 30; Rhee, 2000: 488; Byeon, 2005: 225).

Dynamics of Complex Systems

An essential feature of the complexity theory paradigm is the concept of complex adaptive systems (CAS). Systems that absorb information from their environment and create stores of knowledge that can aid action are called "complex adaptive systems" (Mason, 2007: 18; Fioretti and Visser, 2004: 14). The concept of CAS tries to explain how learning and innovation happen in living systems, and is used to describe "nonlinear systems" whose behavior is determined by the interaction of its adaptive parts (Price, 2004: 44; Meek et al., 2007: 28; Foster, 2005: 880). The parts in a CAS are diverse in form and ability (Sherif, 2006: 75). The system derives its complexity from the diversity of, and the level of interaction between the parts. The complexity of the system arises from the collective control that the parts exert on the whole. Thus, the higher the number of parts, the higher the level of interaction between them, and consequently the harder it is to predict the system's behavior (Kaufman, 1993: 39; Morel and Ramanujam, 1999: 281).

While each part of a complex system acts according to its own best interest, collectively they cause the system to move in a certain direction, which may be hard to

predict. Since there is no central control unit in a complex system, it is difficult to determine the attribution of any one part to the performance of the whole because of the confounding effect of a change in one part on other parts and the whole (Ferlie, 2007: 161; Mckenzie and James, 2004: 36; Mason, 2007:16). The parts are constantly seeking to improve performance by driving the system away from equilibrium (Kaufman, 1993: 47; Sherif, 2006: 75). Over time, the extensive interaction between the parts determines the behavior of the overall system within its environment. The parts learn from these interactions and restructure themselves to better adapt to the environment (Levinthal, 1997: 69; Styhre, 2002: 347; Montouri, 2000: 67).

Within the apparent randomness of a complex system, patterns can be found (Mason, 2007: 25; Rhee, 2000: 489). These patterns are known as "attractors" (Montuori, 2000: 69; Foster, 2005: 885). At this stage, forces that maintain order coexist with forces pushing the system towards disorder, thereby allowing both flexibility and structural integrity. Such a complex system is capable of restructuring (Meek et al., 2007: 33; Sullivan, 2004: 50; Paraskevas, 2006: 901) and explorations in which innovations are discovered in a bid to improve performance (Mason, 2007: 13; Morel and Ramanujam, 1999: 287; Mckenzie and James, 2004: 36; Ferlie, 2007: 161).

Characteristics of Complex Systems

Complex systems have a number of common characteristics. One of such characteristic is the presence of large number of interacting elements within the system. The elements interact with one another, and such interactions are typically associated with the presence of feedback mechanisms in the system. The interactions in turn produce non-linearities in the dynamics of the system (Morel and Ramanujam, 1999: 289; Sherif, 2006: 77; Price, 2004: 43).

Second, complex systems are dissipative structures, that is, a semi-stable configuration that does not correspond to external pressures and manipulations in a linear manner (Prigogine: 87; Styhre, 2002: 346; White, 2000: 17). Dissipative structures operate in accordance with non-linear logic (Rhee, 2000: 488; McElroy, 2000: 197). A dissipative structure can, for instance, absorb significant external pressure in certain positions, yet can be significantly altered by only minor influences in other positions (Fioretti and Visser, 2004: 19; Meek et al., 2007: 31). The organization is pushed further away from equilibrium and the situation moves towards the crisis stage. This causes some disorder (instability) within the organization. At the crisis stage, the organization's structure holds the organization together and dissipates the "fluxes of energy" coming into it (Paraskevas, 2006: 896; Ferlie, 20007: 161; Mason, 2007: 12).

Third, complex systems have the ability for self-organization and adaptation. Parts of the system can self-organize rather than being imposed upon by centralized control (Sherif, 2006: 73; Price, 2004: 44; Styhre, 2002: 348). Self-organization happens as the various decentralized parts of the system interact. Adaptation refers to behaviors which allow the system to survive changes in its environment. It is a response to changes that may reduce the efficiency of the system's behavior. Adaptation means the overall responsive behaviors of a system to changes in its environment (Byeon, 2005: 226). It denotes the ability of a system to modify itself or its environment in response to environmental disturbances that threaten the system's efficiency. Adaptation often occurs when the organization is redirecting its internal processes in order to become more competitive (Montuori, 2000: 66; Fioretti and Visser, 2004: 15). Usually, adaptive behavior occurs where there is enough stability to sustain existence and enough turbulence for creativity to overcome inertia (Mason, 2007: 18;

Paraskevas, 2006: 901; Meek et al., 2007: 32). Continuous self-organization and adaptation allow and encourage a number of creative responses to emerge from changing environments (Morel and Ramanujam, 1999: 287; Steele: 2). In complex systems, feedback loops are one of the major elements that make self-organizing systems effective (Rhee, 2000: 489; McKenzies and James, 2004: 36).

Finally, complex systems tend to exhibit emergent properties. This means that patterns emerge which are due to the collective behavior of the components of the system. The emergent properties are independently observable and empirically verifiable patterns (Ferlie, 2007: 159; Meek et al., 2007: 25). Emergence happens after the system's parameters change, and the system is heading towards disorder. The ensuing crisis draws the organization in a particular direction (Pascale et al., 2000: 101), and triggers behavioral changes in the organization. This is the stage where the organization reaches the threshold of "bifurcation" or a "phase transition" (Paraskevas, 2006: 901; Sullivan, 2004: 49). At this stage, the system may either break down leading to the demise of the organization, or break through to one of several new states which will emerge from the self-organization of the organization's components (Kaufman, 1993: 98). The organization begins to display new "emergent" properties whereby its components take on new behaviors that none of them had before (McElroy, 2000: 198). The experience of the organization from the crisis will become part of its organizational learning and will influence its behaviors in the future (Paraskevas, 2006: 894; Montuori, 2000: 66; Ferlie, 2007: 156). Examples of self-organization and emergence include development of new strategies, development of marketing tactics for specific prospects self-directed teams, and the growth of strategic alliances (Sullivan, 2004: 46; Price, 2004: 43; Meek et al. 2007: 27).

Implications of Systems and Complexity Theories for Organizations

Systems and complexity theories are theories of organizational change that have implications for organizations. Organizations are dynamic systems of adaptation and evolution that contain multiple parts, which interact with one another and the environment. The ability of organizations to change rapidly in response to intra and inter relationships is at the heart of an adaptive organization (Brown and Eisenhardt, 1997: 45; Morel and Ramanujam, 1999: 281).

The external environment is generally beyond the control of any organization and comprises of the competition, the economy, social-cultural-demographic factors, political-legal-governmental aspects, technology, and the natural environment (Capps and Hazen, 2002: 310; Beeson and Davis, 2000: 183). Since organizations are complex systems, an implication is that the organization is able to learn from its environment and change its internal structure and its functioning over time, thus changing the behavior of individual elements (Sherif, 2006: 77; McElroy, 2000: 197; Paraskevas 2006: 901). These changes in environmental factors can lead to turbulence in the organization in response to rapid, unexpected change in the environmental (Mason, 2007: 12; Styhre, 2002: 344). Growth in environmental turbulence can be the result of a reduction of orderly competition, an increasing need for information, innovation, quicker cycles of development, and more difficulty in predicting customer, product and service requirements (Beeson and Davis, 2000: 185; Rhee, 2000: 488; Morel and Ramanujam, 1999: 287; Montuori, 2000: 68).

An understanding of systems and complexity theories provides an enhanced appreciation of how each of the sub-systems of the organization interconnects and interacts, and the nature of the interplay between the various components. Such an understanding can

help organizational leaders plan how to better obtain resources such as raw materials and information, transform resources by making use of the social and technological components, and produce the best results (Yoon and Kuchinke, 2005: 17).

A basic tenet of organization theory is that an organization's information processing capacity should be tailored to the information processing requirements of its environment (Fioretti, and Visset, 2004: 19). This is not the case when an organization views its environment as complex. Since complexity theory views organization change as comprising a complex, integrated, socially embedded and socially dependent process affected by a variety of causes and concepts (Sullivan, 2004: 50; Paraskevas, 2006: 898), managers aware of complex interactions are in a better position to understand the dynamics and behavior of an organization, and to guide strategy development (Mason, 2007: 13; Houchin and Maclean, 2005: 153; Farazmand, 2003: 346).

Both systems theory and complexity theory form the basis of two organization change approaches that can be valuable in explaining the behavior of organizations in coping with continuous change (Foster, 2005: 877; Sullivan, 2004: 47; Sherif, 2006: 77). They provide a conceptual foundation that can help in prioritizing system performance levels and examining how they proactively and collectively seek to solve and adapt solutions (Styhre, 2002, 346; Price, 2004: 45). This implies that changes are produced on the basis of several interconnected causes and effects. An understanding of the complexity and systems paradigms makes organizational behavior subject to surprises and hard to predict, thereby making the attainment of organizational effectiveness non-obvious (Fioretti and Visser, 2004: 19). As a result, decision-makers are more conscious of the limits of their knowledge and abilities. This allows organizational leaders to engage in a learning process with the complex system they are facing. Complexity theory has been utilized in studies of organizational transformation, corporate strategy, organization culture, and organization design, to mention but a few (Styhre, 2002: 343; Yoon and Kuchinke, 2005: 16; Wang, 2004: 397; Mason, 2007: 11; White, 2000: 164).

Implications of Systems and Complexity Theories for Public Administration

Public administration and political institutions possess the capacity to transform themselves, their goals, practices and the very structure of their internal organization. In democratic states with vibrant civil society, the more complex the mechanism of political systems, the more adaptive its institutions (Ferlie, 2007: 157; Farazmand, 2003: 341; Mandell, 2004: 139). In terms of systems and complexity theories, public organizations and public administration are regarded as adaptive as well as open to their environment.

Systems theory can be useful in policy making. It can be used as a mechanism to enhance understanding when public policy is made and to generate concepts, ideas and modes of action when policy-makers need to make recommendations about policy problems (Stewart and Ayres, 2001: 84). Rather than selecting instruments to fit a particular policy problem, systems analysis suggests that the nature of the problem cannot be understood separately from its solution. For policy problems characterized by complexity, using systems concepts offers a way of rationalizing aspects of existing practice and of suggesting directions for improvement (White, 2000: 168; Rhee, 2000: 488; Stewart and Ayres, 2001: 85). An understanding of systems paradigm can offer policy makers a fresh set of perspectives on the fundamentals of policy analysis (Stewart and Ayres, 2001: 81).

Public administration is comprised of interrelated activities (Rhee, 2000: 488; White, 2000: 172; Stewart and Ayres, 2001: 82). The dynamics of public administration can be

understood in terms of phase transitions of exchange of material, energy and information with its environment through complexity theory. Public organizations are dissipative structures which may emerge in a particular threshold conditions in the evolutionary processes of political, social, and economic systems (Ferlie, 2007: 161). While traditional public administration is characterized by processes of rationalization, centralization, specialization, and bureaucratization (Ferlie, 2007: 160), post-modern public administration is characterized by fragmentation, networking, and decentralization. Within the postmodern viewpoint and in line with complexity theory paradigm, the bureaucratic form of public administration is giving way to themes and theories of democratic governance, links with the public, and responsiveness to citizens (White, 2000: 171; Stewart and Ayres, 2001: 84).

Administrative networks, shared governance, and co-production of public services are typical examples of the emergent properties of public administration as a complex adaptive system (CAS). New public management (NPM) and public sector revitalization campaigns are examples of organizational change models that seek to reduce bureaucracy and design more entrepreneurial public organizations (Ferlie, 2007: 160; Meek et. al., 2007: 27; Rhee, 2000: 489). In recent years there has been a rapid emergence of non-state social enterprises such as Non-Governmental Organizations and other networks organized on a more localized, informal, and value driven basis (White, 2000: 171; Farazmand, 2003: 351; Mandell, 2004: 144). As the production of social capital and public trust of governance decline in response to the increasing inability of hierarchical, top-down, command-and-control institutions to solve complex societal problems (Meek et al., 2007: 24), the fundamental nature of associations among citizens, policy makers, civic leaders, and government has been transforming as government seeks to be more responsive to the needs of citizens.

Complexity theory has important potential for understanding the behavior of the economy and political systems, especially when impacted by sudden events. The principle of "order through chaos' is useful in providing a new light for understanding survival of public institutions, especially during turbulence. For example, in transitional societies there have been fluctuations which transform the complex political system into new emergent regimes. The notions of chaos and order, change and continuity, uncertainty and certainty, and the growing realization of the complexity and non-linear dynamic features of modern organizations are the realities public organizations must face in order to adapt to the global environment (Houchin and Maclean, 2005: 156; Farazmand, 2003: 348; Smith 2004: 75). Styhre, 2002: 347).

Conclusion

By using theories of organizational change, this paper attempts to describe the complex, dynamic, unpredictable and sometimes chaotic process of organizational transformation (Sullivan, 2004: 50; Styhre, 2002: 348). Organizational change activities can be successfully examined from complexity and systems theories framework. The organizational change paradigms discussed in the paper suggest that changes are produced on the basis of a number of interconnected causes and effects whose relationships are complicated to conceive of from an analytical framework based on linearity. Systems and complexity models can offer more promising avenues from which organizational leaders can appreciate and address complex organizational dilemmas.

About the Author

Francis Amagoh, Ph.D. is an associate professor in the Department of Public Administration, Kazakhstan Institute of Management, Economics and Strategic Research, where he teaches courses in public administration, financial management, and public finance. His research interests include the use of information technology to increase organizational efficiency, knowledge management, organizational learning, and productivity improvements for business and public organizations.

References

Alter, S. 2007. "Could the work system method embrace systems concepts more fully?" *Information Resource Management Journal*, 20(2), 33-43.

Ashmos D., and G. Huber. 1987. "The Systems paradigm in organization theory: correcting the record and suggesting the future". *Academy of Management Review*, 12(4), 607-621

Bailey, K. 1990. *Social Entropy Theory.* State University of New York Press: Albany, NY.

Bausch, K. 2002. "Roots and branches: a brief, picaresque, personal history of systems theory". *Systems Research and Behavioral Science*, 19(5), 417-428.

Beeson, I., and C. Davis. 2000. "Emergence and accomplishment in organizational change". *Journal of Organizational Change Management*, 13(2), 178-189.

Boulding, K. (1956). "General systems theory – the skeleton of science". *Management Science*, 2(1), 197-208.

Brown, S., and K. Eisenhardt. 1998. *Competing on the Edge.* Harvard University Press, Boston, MA.

Byeon, J. 2005. "A systems approach to entropy change in political systems". *Systems Research and Behavioral Science,* 22, 223-231.

Cao, G., and M. McHugh. 2005. "A systemic view of change management and its conceptual underpinnings". *Systemic Practice and Action Research*, 18(5), 475-490.

Capps, C., and S. E. Hazen. 2002. "Applying general systems theory to the strategic scanning of the environment from 2015 to 2050". *International Journal of management*, 19(2), 308-314.

Castells, M. 1996. "The network enterprise: the culture, institutions, and organizations of the informational economy. In M. Castells (Ed.), *The Rise of the Network Society* (151-200). Oxford, UK: Blackwell.

Chakravarthy, B. 1997. "A new strategy framework from coping with turbulence". *Sloan Management Review,* Winter, 69-82.

Clippinger, J. III. 1999. "Order from the bottom up: complex adaptive systems and their management. In J. Clippinger (Ed.), *The Biology of Business: Decoding the Natural Laws of Enterprise.* (1-30). San Francisco: Jossey Bass.

Dubrovsky, V. 2004. "Toward system principles: general system theory and the alternative approach". *Systems Research and Behavioral Science*, 21(2), 109-122.

Farazmand, A. 2003. "Chaos and transformation theories: a theoretical analysis with implications for organization theory and public management". *Public Organization Review,* 3(4), 339-372.

Ferlie, E. 2007. "Complex organizations and contemporary public sector organizations". *International Public Management Journal*, 10(2), 153-165.

Fioretti, G., and B. Visser. 2004. "A cognitive interpretation of organizational complexity". *Emergence: Complexity & Organizations, Special Double Issue*, 6(1-2), 11-23.

Foster, J. 2005. "From simplistic to complex systems in economics". *Cambridge Journal of Economics*, 29, 873-892.

Houchin, K., and D. Maclean. 2005. Complexity theory and strategic change: an empirically informed critique". *British Journal of Management,* 16(2), 149-166.

Kast, F., and J. Rosenzweig. 1973. *Contingency views of organization and management.* Chicago: Science Research Associates, Inc.

Katz, D., and R. Kahn. 1978. *The Social Psychology of Organizations.* (2nd Edition). New York: Wiley.

Katz, D., and R. Kahn. 1966. *The Social Psychology of Organizations*. New York: Wiley.

Kaufmann, S. 1993. *The Origins of Order.* Oxford University Press, Oxford.

Levinthal, D. 1997. "Adaptation and rugged landscapes". *Management Science,* 43, 934-950.

Mandell, M. 2004. "The impact of network structures on community-building efforts: the Los Angeles Roundtable for children community studies", in M. Mandell (Ed.), *Getting Results Through Collaboration: Network and Network Structures for Public and Policy Management*. (129-153).

Martinelli, D. P. 2001. "Systems hierarchies and management". *Systems Research and Behavioral Science*, 18(1), 69-82.

Mason, R. 2007. "The external environment's effect on management and strategy. A complexity theory approach". *Management Decision*, 45(1), 10-28.

McKenzie, C., and K. James. 2004. "Aesthetic as an aid to understanding complex systems and decision judgement in operating complex systems". *Emergence: Complexity & Organizations, Special Double Issue*, 6(1-2), 32-39.

McElroy, M. W. 2000. "Integrating complexity theory, knowledge management and organization learning". *Journal of Knowledge Management*, 4(3), 195-208.

Meek, W. J., J. De Ladurantey, and W. H. Newell. 2007. "Complex systems, governance and policy administration consequences". *Emergence: Complexity & Organizations, Special Double Issue* 9(1-2), 24-36.

Melcher, A. 1975. *General Systems and Organization Theory: Methodological Aspects.* Kent State University Press

Montuori, L. A. 2000. "Organizational longevity. Integrating systems thinking, learning and conceptual complexity". *Journal of Organizational Change Management*, 13(1), 61-73.

Morel, B., and R. Ramanujam. 1999. "Through the looking glass of complexity: the dynamics of organizations as adaptive and evolving systems". *Organization Science*, 10(3), 278-293.

Paraskevas, A. 2006. "Crisis management or crisis response system? A complexity science approach to organizational crisis". *Management Decision*, 44(7), 892-907.

Prigogine, I. 1997. *The End of Certainty: Time, Chaos, and the New Laws of Nature.* Free Press: New York, NY.

Price, I. 2004. "Complexity, complicatedness and complexity: a new science behind organizational intervention?" *Emergence: Complexity & Organizations, Special Double Issue*, 6(1-2), 40-48.

Pascale, R., M. Millemann, and L. Gioja. 2000. *Surfing the Edge of Chaos.* Three Rivers Press, New York, NY.

Randolph, A., and R. Blackburn. 1989. *Managing Organizational Behavior.* Boston: Irwin

Rhee: Y. 2000. "Complex systems approach to the study of politics". *Systems Research and Behavioral Science*, 17(6), 487-491.

Schoderbek: 1971. *Management systems.* New York: John Wiley and Sons, Inc.

Shrode, W., and D. Voich, Jr. 1974. *Organization and Management: Basic Systems Concepts.* Homewood: Irwin Inc.

Sherif, K. 2006. "An adaptive strategy for managing knowledge in organizations". *Journal of Knowledge Management*, 10(4), 72-80.

Skyttner, L. 1996. *General Systems Theory: An Introduction.* London: Macmillan Press, Ltd.

Smith, A. 2004. "Complexity theory and change management in sport organizations". *Emergence: Complexity & Organizations,* 6(1-2): 70-79.

Steele, M. D. 2003. "Margins count: systems thinking and cost". *AACE International Transactions*, PM.03: 03.1-03.5.

Stewart, J., and R. Ayres. 2001. "Systems theory and policy practice: an exploration". *Policy Sciences*, 34(1), 79-88.

Styhre, A. 2002. "Non-linear change in organizations: organization change management informed by complexity theory". *Leadership & Organization Development Journal,* 23(6), 343-351.

Sullivan, T. 2004. "The viability of using various system theories to describe organizational change". *Journal of Educational Administration*, 42(1), 43-54.

Wang, T. 2004. "From general system theory to total quality management". *Journal of American Academy of Business*, 4(1/2), 394-400.

White, L. 2000. "Changing the "whole system" in the public sector". *Journal of Organizational Change Management*, 13(2), 162-177.

Yoon, S., and K. P. Kuchinke. 2005. "Systems theory and technology. Lenses to analyze an organization". *Performance Improvement*, 44(4), 15-20.