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Book Review

Coping with Chaos: Seven Simple Tools. By Glenda Holladay Eoyang. Lagumo Corp., Wyoming. 196 p.

About two decades ago, it is generally believed that organizational structures and evolution could be analyzed by applying the Newtonian principles. This belief has been challenged since nonlinear theory has become widely applied in social sciences. This book uses a number of examples to illustrate how nonlinear science can provide us a new vision about dynamics of management and organization. The contents of the book are timely and very interesting. The book is well organized. The author introduces some nonlinear tools to explain complex of organization world today. Instead of being concerned with scientific detail or mathematical rigor, the author often applies the scientific concepts metaphorically to management and organizational problems. The book discusses various issues related to how to apply nonlinear theory to handle with complex of management. It outlines the emerging field of nonlinear management in an attractive way.

The book starts with comparing linear and nonlinear visions of systems evolution. It points out that in contrast to the Newtonian perspective of the world which is characterized by machine-like, linear, predictable, orderly, controlled or controlling, and designed, the complex perspective is characterized by organism, nonlinear, surprising, patterned, adaptable or adapting, and emergent. It is reasonable to observe that managers who are influenced by the Newtonian vision of the world tend to make their decisions typically as follows: management by objective, individual accountability for performance, preference for order-followers, lack of respect for individual employees, keeping management plans secret, lack of innovation, and undue attention to internal procedures and policies. This Newtonian management was functional in the past under the conditions of isolated markets, government regulations, widespread monopolies, domination of white males in business and so on. In general, the manager may be effective to use Newtonian techniques when the problem is quite familiar, well-defined, closed to outside influence and linear relationships between inputs and outputs. But strategies based on the Newtonian mechanistic perceptions will not work

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today under situations when the problem is fuzzy, open to outside influence and nonlinear relationships between inputs and outputs. The author points out that new strategies are required.

In order to face with new challenges in changed situations, the author argues the necessity of applying nonlinear vision to management. Instead of being broadly concerned with implications of nonlinear theory, the author focuses a few aspects of nonlinear theory. She describes general characteristics of complex adaptive systems and their possible implications for understanding management and organizational structures in seven chapters.

The idea that a small change in environment may cause a tremendous effect is discussed in Chapter 1. In linear stable systems it is true that small changes can cause only small impact on the system. But in a nonlinear dynamic world a small cause can have tremendous effects through a series of nonlinear magnification. This implies that a long-run predication of the complex system is doomed to failure. The manager is faced with both positive and negative butterfly effects. Positive butterflies move the complex system toward acknowledged productive goals, and negative butterflies move the system away from these goals. The author suggests some ways for the chaotic manager to stop the spread of negative and encourage the spread of positive butterflies.

Chapter 2 tells us how to apply the concept of boundary in nonlinear theory to understand dynamics of organizations. Organizational dynamics come from differences. These differences are marked by boundaries such as departmental distinctions and distinctions based on cultural backgrounds or gender. Variations in organizational levels, opinions, business functions, talent, gender, ability, and cultural contexts may provide opportunities for change among parts of the organization. These boundary conditions determine how two different parts of each system relate to each other. A boundary may be distinct or indistinct, clear or ambiguous, partially permeable or impermeable. The conditions at the boundary determine the nature of changes resulting from the differences. For instance, at clear and distinct boundaries within the organization turbulent change such as turf battles and jealousy may take place. At indistinct boundaries one may observe personality conflicts, "good old boy" networks, unresolved resource battles and inconsistent hiring practice across an organization. The author analyzes what kinds of changes tend to take place at different kinds of boundaries within the organization.

Chapter 3 shows us how to perceive organizational structures as transforming feedback loops. A transforming feedback loop is a special kind of interdependence that links the parts of a complex system into a functioning whole. It is the form of communication that passes across the boundary between any two parts of a complex system. When one part of the system

changes, this change will affect the second part of the system; changes in the second part will be transmitted back to the first part, and processes will be continued. A transforming feedback loop consists of such a transfer and the changes engendered by the transfer. In such a system there is no single controlling part. The interdependencies of the parts determine the behavior of the system as a whole. When applying this mechanism for change to a complex organization, we find that the expectation for a single-point cause, such as manager or customer, of change is doomed to failure because each individual agent is only one source of feedback among multiple feedback loops. By applying the conception of feedback loops, the author shows the significance of 'networking thinking' for understanding organization. The reader also finds some examples about how to use the conception to study information flows across boundaries in complex systems.

Chapter 4 applies the concept of fractal which is a geometrical object resulting from multiple solutions of nonlinear equations to management systems. A complex organic system may begin with a small piece of matter that contains a code for the whole. Then, it follows the code to draw in and transform material from the environment to create a whole new entity. This transformation process is repeated many times, with slight variations for each cycle. This process, beginning with a simple 'seed' and expanding through complex replications, generates an object of infinite complexity and functionality. This kind of geometrical object is called fractal. The author explains how fractals are generated and how the fractal can be used to describe a complex organization. The fractal process creates a structure with the characteristics of self-similarity, scaling, creative differences, fuzzy boundaries, and variable stability within the system. She points out that the fractal model provides a flexible structure that is not refined by boundaries but is determined by its core. In fractal organization, the core stays constant in the midst of environmental change, but the specific structures and interactions of the parts within the organization and between the organization and its environment are in constant transformation. This chapter shows that the manager may properly apply the fractal characteristics, by processes such as recognizing change through evolution, finding the seed, using the seed to generate change, recognizing and reinforcing variety, acknowledging fractal boundaries, and introducing change at unstable points of the system, to create effective organizational structures.

Attractors provide information about system-wide patterns of behavior of highly interdependent nonlinear systems. In complex systems, patterns of system behavior are shaped in large by attractors. Chapter 5 applies the concept of simultaneous existence of multiple attractors in the dynamic system to explain functioning of the organization. In a complex system,

multiple patterns may be possible. The manager should be prepared to face with multiple possibilities of long-run structural behavior of the environment and the organization. The author illustrates the three classes of attractors, points, periodic and strange attractors and identifies each kind of attractor in organizations. Each kind of attractor in business can be productive and effective or distracting and disruptive to the organization as a whole. It is important for the manager to recognize the characteristics of these attractors in structural behavior of the organizational evolution in order that the manager can effectively allow attractors to positively develop over time, to observe, evaluate their efficiency and intervene in the system to influence the future paths of the attractor regimes.

Chapter 6 is concerned with the conception of self-organization and its implications for organizational structures. Self-organization theory shows that when complex systems become sufficiently disorganized, they generate their own order. When a complex system is far away from its equilibrium, the system spontaneously reorganizes itself without any obvious plan or the control of any single individual component. This process is the so-called self-organization. Applying this theory to management, we see that an organization may experience a change through market presses or other external changes. The external changes stress the organization by moving it out of its equilibrium state. Then, the organization spontaneously generates a new structure, without involving an all-seeing manager who is in charge of the change. A new structure emerges through self-organization. This new structure is formed through high interdependence among components of the complex system and transforming feedback loops to allow changes in one part of the system to influence adaptation in other parts of the system.

An organic complex system includes subsystems embedded in and related to other subsystems. The whole consists of complex interdependencies between these subsystems. Coupling describes the attachments between various subsystems within the complex system. The parts of the system and their subsystems are coupled together, and the coupling determines the amount and kind of influence each has on others and on the behavior of the whole. Chapter 7 is concentrated on implications of coupling for management. The author is concerned with three different types of couples in complex systems: tight couples, loose couples and uncouples. A tight couple represents a high degree of influence between two parts of the system. This may be perceived as a special kind of transforming feedback loop. This chapter provides a number of examples of couplings in organization. Since each organization is a complex network of systems and subsystems and each of which has established a coupling relationship with all others, it is important for the manager to recognize the characteristics of

each kind of coupling so that the manager can establish a combination of tight, loose and uncouples to optimize resource and information in the organization.

The book ends with a case study to demonstrate how the concepts introduced in the book can help us to understand the evolution of organization.

The book has much to recommend. The book shows that science of chaos and complexity can define a set of questions to guide our actions when answers are not predictable. The complex dynamics within an organization can be understood in terms of complex underlying structures and behavior of complex systems. It provides a balanced illustration of important principles in nonlinear management. The book is not technical, so that technical as well as non-technical readers can appreciate the book.

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