

Chapter 18

Utilizing Complexity Theory and Complex Adaptive Systems in Global Business

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ABSTRACT

This chapter aims to utilize complexity theory and complex adaptive systems in global business, thus describing the theoretical and practical overview of complexity theory, the application of complex adaptive systems, and the significance of complexity theory and complex adaptive systems in global business. The utilization of complexity theory and complex adaptive systems is vital for modern organizations that seek to serve suppliers and customers, increase business performance, strengthen competitiveness, and acquire routine success in global business. Thus, it is essential for modern organizations to utilize complexity theory and complex adaptive systems, create a strategic plan to investigate their dynamic promotions, and instantly respond to the needs of customers. The chapter argues that utilizing complexity theory and complex adaptive systems has the potential to improve organizational performance and gain sustainable competitive advantage in global business.

INTRODUCTION

The organizational literature has considered complexity as an important factor influencing organizations (Hanisch & Wald, 2014). In the global markets where most organizations operate, the perspectives for competitiveness, flexibility, and dexterity has increased, and this demands for more adaptive structures (Arévalo & Espinosa, 2015). In this context, contemporary complexity theories that inspire managers with ideas about self-organization and neural network-like organizations are in demand, both in academic journals and in consultancy (Mitleton-Kelly, 2011). This is the case with social sciences researchers, which are increasingly attracted to the notions of permanent innovation, coevolution, and decentralized decision making in global business (Allen, Maguire, & McKelvey, 2011).

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Complexity theory paradigm is in the process of being taken up from the natural sciences into the social sciences and humanities (Murray, 2008). Complexity theory is an effective domain to consider organizational response (Trenholm & Ferlie, 2013). Complexity theory is applied in organizational studies (Caldwell, 2006; Richardson, 2005; Stacey, 2003), public health (Durie & Wyatt, 2007), education studies (Zellermayer & Margolin, 2005), and policy studies (Callaghan, 2008; Morçöl, 2010; Sanderson, 2009). Complexity theory offers the new ways of thinking about some of the classic dilemmas in the social sciences, in particular, engaging with the tension between the examination for general theory and the desire for contextual and specific understandings (Calhoun, 1998; Haydu, 1998; Kiser, 1996), which lies at the essence of tension between realist approaches (Bhaskar, 1997; Byrne, 1998; Somers, 1998), and postmodern approaches (Cilliers, 1998; De Landa, 2000).

Complexity theory gains popularity in the discipline of the social sciences, organization studies, and management studies (Gerrits, 2009). Advocates of complexity theory describe it as a new scientific paradigm (Mitchell, 2009). Complexity theory has applied to the study of neuroscience, ecology, epidemiology, memory coding, computer science, metabolic networks (Arenas, Diaz-Guilera, Kurths, Moreno, & Zhou, 2008), and social sciences (Teisman & Klijn, 2008). Complexity theory is used to understand international relations (Jervis, 1998), public policy, and policymaking institutions (Geyer & Rihani, 2010). Academicians and practitioners utilize complexity theory to recommend the new forms of policymaking (Sanderson, 2009).

Complex adaptive systems are recognized as a theoretical foundation for studying group development, organizational culture, inflection points, nested adaptive cycles, leadership development, and innovation advancement (Edson, 2012). Complex adaptive systems are the special kinds of self-organizing system with emergent properties and adaptive capacity in response to the changing conditions (Kim & Mackey, 2014). Complex adaptive systems are made up of a diverse range of components, including individuals, organizations, physical resources, and other complex systems (Byrne, 2011). Complex adaptive systems are the neural-like networks of interdependent agents who are bonded in a cooperative dynamic by common goal, outlook, and requirement (Uhl-Bien, Marion, & McKelvey, 2007).

Complex adaptive systems include the adaptive agents (Liang & Huang, 2013). Complex adaptive systems approach is required for evaluating infrastructure projects (Verweij & Gerrits, 2013). Complex adaptive systems thinking is a subset of complexity theory (Casti, 1979). Complex adaptive systems thinking is used to investigate leadership styles, organizational change, team dynamics, and sustainability (Brown, 2008; Glatter, 2006; Harkema, 2003). The greater the level of adaptability, the more productive the organization is likely to be (Silverthorne & Wang, 2001). Rather than learn the new methods for evaluation, individual can apply complex adaptive systems thinking to the existing methods (Cabrera, Colosi, & Lobdell, 2008). Complex adaptive systems theory helps explain the challenges that organizations face (McDaniel, Jordan, & Fleeman, 2003). Complexity theory suggests that complex adaptive systems change to adapt to their environments (Hogue & Lord, 2007). There are the important limits to a reductionistic approach to understanding organizational processes (Cilliers, 1998) because complexity arises from the nonlinear interactions of many parts of a system, with interactions being highly sensitive to the history of the components and to their current context.

The strength of this chapter is on the thorough literature consolidation of complexity theory and complex adaptive systems in global business. The extant literatures of complexity theory and complex adaptive systems provide a contribution to practitioners and researchers by describing a comprehensive view of the functional applications of complexity theory and complex adaptive systems to appeal to the

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