

Chapter 3

Basics of Complexity Theory

ABSTRACT

This chapter deepens the exploration of complexity theory by focusing on its application across diverse organizational contexts, including but not limited to global health systems. Rather than viewing complexity as a barrier, the discussion reframes it as a vital resource for innovation, particularly when organizations face unpredictable challenges. The analysis highlights how complexity theory supports decentralized decision-making, flexible system architecture, and adaptive leadership models. In the case of Electronic Health Records (EHR), the theory encourages the development of modular, interoperable platforms that can evolve with shifting global demands. It also emphasizes the value of cultural intelligence and system resilience, particularly when operating across international boundaries. The chapter further evaluates case-based implementations and policy-level insights, offering guidance for integrating complexity principles into strategic planning and system design. This discussion shows that embracing complexity enables more responsive, equitable, and sustainable solutions.

INTRODUCTION

Complexity theory in organizations, also known as complexity strategy or complex adaptive organizations, applies insights from the study of complex systems to strategic management and organizational studies. The theory “is “the scientific study of systems with many interacting parts that exhibit a global behavior not reducible to the interactions between the individual constituent parts” (Thietart & Forgues, 2011, p. 53). It draws upon research from natural sciences that explores uncertainty and nonlinear dynamics. Emphasizing interactions and feedback loops, complexity

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theory highlights the continuous evolution of systems. While it suggests that systems are unpredictable, they are also governed by rules that generate order.

In strategic management and organizational studies, complexity theory finds application in understanding how organizations or firms adapt to their environments and navigate uncertainty. Organizations are characterized by dynamic networks of interactions rather than mere aggregations of static entities. They exhibit adaptive behaviors, where individual and collective actions evolve and self-organize in response to micro-events or sequences of events that trigger change.

COMPLEXITY THEORY

Modern organizations operate within increasingly complex and dynamic social systems. Even before the onset of the COVID-19 pandemic, they faced challenges posed by disruptive technologies, blurred organizational boundaries, and rapidly evolving customer demands (Pavlov & Micheli, 2023). These conditions have pushed conventional management theories and frameworks to their boundaries, especially concerning organizational performance management, encompassing strategies to enhance process efficiency and overall organizational performance through implementing performance measurement systems that facilitate gathering, analyzing, and disseminating pertinent data.

Several complexity features are considered when applying Complexity Theory (McGuire, 2011), beginning with the understanding that complex systems are diverse systems (Figure 1).

Figure 1. McGuire's features of complex systems

- McGuire (2011) Constructing and appreciating complexity**

 - ✓ Complex systems consist of a large number of diverse elements
 - ✓ These elements interact dynamically
 - ✓ Interactions are rich: elements can influence each other
 - ✓ Interactions are nonlinear
 - ✓ Interactions are typically short-range
 - ✓ Interactions have positive and negative feedback loops
 - ✓ Complex systems are open to their environment
 - ✓ Complex systems operate under conditions far from equilibrium
 - ✓ Complex systems have histories
 - ✓ Individual elements are typically ignorant of the behavior of the system as a whole

Pavlov and Micheli (2023) suggest that to understand the importance of Complexity Theory, two insights should be considered, “the view of organizations as complex systems and the understanding of organizational performance as an emergent

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