

# Chapter 18

## Toward a Conceptualization of Organizational Modularity

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### ABSTRACT

*Organizations are complex systems made up of many different elements interacting with each other. One particular form of organizational design, emerging from the need to deal with organizational complexity and environmental uncertainty, is modularity. There are several studies in the literature dealing with organizational modularity. However, neither a common definition nor a complete measurement model is proposed for this concept. What are the common properties of an organization characterized as highly modular? How are these properties related to organizational design parameters? None of these questions have been adequately addressed in the literature. Thus, this chapter aims to identify the common properties of an organization which can be considered to be highly modular and to propose a theoretical conceptualization of organizational modularity based on a framework originally linking Baldwin and Clark's visible design rules with Mintzberg's organizational design parameters and provides a suggestion for operationalizing the concept of organizational modularity.*

### INTRODUCTION

Organizations are complex systems made up of many different elements interacting with each other. Understanding how organizations cope with complexity and adapt to their changing environments has interested organizational theorists and practitioners for a long time. One prevalent way suggested to manage a complex system is to divide it into smaller parts by considering the joints as nature does (Baldwin & Clark, 2000; Alexander, 1964). Different structural configurations (see Mintzberg, 1979) are used

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in practice to divide the work in an organization and to coordinate its different parts. Some of these configurations helped organizations to manage complexity for quite a long time, at least to some extent.

However, organizations of the 21st century need to be more advanced than they were in the late 20th century. Because of advancing technology, environmental uncertainty, and the need to more effectively and efficiently utilize resources, organizations are getting more complex than ever. Increase in size, the number of different types of activities, the number of units and employees, the diversity of products and services, and the technological interdependences produce greater complexity in organizations. Despite this, a considerable number of organizations still rely on hierarchical rigid structures regardless of their appropriateness for them.

Over the last decades improvements in technology has increased the level of competition and allowed firms to enter new markets. For example, advancements in production technology have shorten organizational life cycles, creating pressure for both flexibility and efficiency (D. L. Nelson & Quick, 2013). Developments in information technology have enabled new ways of communicating, allowing people work across organizational boundaries (Cohen & Mankin, 1998). These developments, however, have let increase the complexity in organizations and created the need for increased integration and coordination.

The ever-increasing complexity and dynamism of the business environment has also affected organizational processes and design. In an uncertain business environment, it is unlikely that a given organization can do everything that it needs to do excellently. They rather focus on those things they can do uniquely well and outsource those functions that are not directly linked to their competences. Organizations without a proper organizational design will hesitate to expand to new markets or to exploit attractive opportunities because of the complexity related constraints imposed by their structures. The costs and barriers to change the system make these organizations reluctant to take proactive steps to utilize the opportunities in the environment. They are likely to be exposed to higher administrative overheads to manage their processes properly and, depending on the level of complexity; this may become even unaffordable (Andrews & Boyne, 2014).

In order to quickly adapt to changing customer requirements and technological advancements, and react to new opportunities in the market, organizations need to review and reconfigure their complex structures and processes. This requires the organizations to gain insight into the interdependencies and interactions among their units. Knowledge of units and their interactions, in turn, helps establishing a set of organizational design rules (c.f. Baldwin & Clark, 2000) that provide a means to deal with organizational complexity.

One particular form of organizational design, emerging from the need to deal with organizational complexity and environmental uncertainty, is modularity. Modularity is a special form of design that decomposes a system into highly independent components by defining how these components will interact and thus governs the ways in which system variants can be configured (Sanchez & Mahoney, 1996; Sanchez, 1999; Asan, Polat, & Sanchez, 2008). Many major theories in biology, physiology, genetics, engineering, mathematics and management rely on modular design (Callebaut & Rasskin-Gutman, 2005). The idea of interdependence within and independence across modules allows organizations to make an architectural change in a sub-system, which does not entail a change in another sub-system. This yields greater flexibility for organizations in both scope and scale (Schilling & Steensma, 2001). In addition, an organization will have the opportunity to outsource some of its functions and switch easily between different providers of these functions, which enables responding to different market needs more quickly. However, it is crucial to note that, it is not reasonable to characterize an organization as modular or not, because organizations are all modular to some extent.

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