The complexity dilemma

Three tips for dealing with complexity in organizations

Alberto Felice De Toni[1], Giovanni De Zan[1]
1 University of Udine

Abstract

Today storm-tossed markets call managers to take a stand on the rising up of external complexity. Organisations are constantly facing a crossroad (complexity dilemma): To accept and nurture complexity, or to avoid and reduce it. The first option can be traced back to Ashby's Law of Requisite Variety, 1. while the second comes from Luhmann's Complexity Reduction, 2. Both Ashby and Luhmann theories are valid due to an inverted U-shaped relation between complexity and firm's performance, called "complexity curve". Once fixed the amount of external complexity, performance increase as internal complexity increase, till reaching a tipping point; after that point, an overburden of complexity sinks performance. To solve Ashby-Luhmann trade-off on complexity, and moving over the complexity curve, we suggest that complex organizing may be facilitated by a simple design through (i) modularity, (ii) simple rules, and (iii) organisational capabilities.

The call of complexity

Today storm-tossed markets call managers to take a stand on how to cope with the rising up of complexity. Companies are constantly facing a crossroad (complexity dilemma): To accept and nurture complexity, or to decline and reduce it? Origins of the first option can be traced back to Ashby's *Law of Requisite Variety*[1] which states that "only variety can destroy variety", so that only complexity can cope with complexity[3]. The amount of internal complexity is optimal when it cope with an equivalent amount of external complexity[4]. While the second option comes from Luhmann's theory of *Complexity Reduction*[2], by which each system has to reduce its environmental complexity through selection or differentiation.

In latest years, following Ashby's law, managers have been urged to complicate themselves as well as their organizations[3]. This complication moves companies far from Occam's razor theory, which told us that it is not necessary to put more on something when it could be done with less. Sometimes over-simplification uncovers system's fragilities as shown, for example, by Ericsson's supply chain crash[5]. Ericsson Inc. simplifies its suppliers portfolio for some components. In March 2000 a fire struck a semiconductor plant in New Mexico, leaving Ericsson short of millions of chips. As results, Ericsson was ultimately driven from the market. This example outlines how complexity brings fragility into the system, that becomes dependent through non-linear connections from a multitude of variables. Each variable has to be considered and managed – as Ashby's law foreseen – because simplifying could make some variables invisible to the system. These variables are those which could disclose system's fragilities (Bonabeau, 2007). At the same time simplification generates a sense of "risky" certainty, which can lead to a lightly view of market changing conditions[6]. Sull[7] refers to *active inertia* to define a similar sort of simplification: responding to market shifts by accelerating activities that succeeded in the past. Both Ashby's and Luhmann's approaches seem right, but which one should be followed?

The present paper aims to identify ways by which companies could solve Ashby-Luhmann trade-offs (complexity dilemmas), finding solution to increase complexity of behaviours and outputs, through simple solutions. This paper, in accordance with José[8] and Pina and Rego[3], suggests that complex organizing may be – paradoxically – facilitated by a simple infrastructure, and that the theory of organizations may be viewed as resulting from the dialectical interplay between simplicity and complexity. We suggest three tips for dealing with complexity: (i) modularity, (ii) simple rules, and (iii) organisational capabilities.

Consequently, the paper begins with an analysis of the existing literature contributions about complexity and performance in order to analyse both pros and cons of both Ashby and Luhmann approaches. Afterward, the paper illustrates the research question and finally, focus on how companies can solve complexity dilemmas.

Theoretical background: Complexity defined

Herbert Simon defined a complex system as "one made up of a large number of parts that interact in a non-simple way. In such systems, the whole is more than the sum of the parts, at least in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole"[9]. After Simon's definition, many works on complexity were carried out and literature distinguishes different typologies of complexity. The main difference occurs