

# Managing complex systems

by Giuseppe Monti

To ask a manager (not a scholar of management) how he handles his business and how he makes his decisions is often like asking a centipede how he manages to walk.



## **An enterprise is undoubtedly a complex system.**

Now let's skip the definition of complexity. It has been calculated that there are at least forty definitions of complexity, all more or less acceptable. On the other hand, there are theories that might help in understanding the concept of complexity: **chaos theory, catastrophe theory, fractals, game theory, entropy.**

There is a vast literature on these theories from influential authors and scholars of different areas of knowledge. It would be possible, and there are several studies on this subject, to apply each theory to the solution of various problems and to find the way to a correct decision. But in management there are often unforeseen problems requiring quick decisions.

What interests us is not to consider the complexity as a barrier but to be able to take advantage of the complex system for the enterprise to have the best management possible. So let us use **the complexity as a value and not as a limit.** In fact, for example, a supersonic aircraft is only complicated, not complex. It is therefore enough to understand how the system works and the manager, based on knowledge and experience, can make his decisions.

Let's start by saying that the enterprise, fortunately, is an **open complex system**. A closed system would be subjected to entropy with catastrophic consequences. Open systems may experience increases in entropy, but they can also achieve production stability conditions of negative entropy, offsetting that with an increase in entropy of the surroundings. For external environment we can consider, in synthesis, the **four elements of influence: Marketing as an instrument of satisfaction of all Stakeholders (shareholders, customers, suppliers, Staff ...), the laws of the State, the relationship with the human resources and scientific and technological progress.**

To go back to our manager he will draw on his wealth of knowledge and experience

- to tackle in a very flexible situations,
- to try to give greater or lesser importance to different occurrences,
- to take advantage of the circumstances to enterprise advantage,
- to synthesize contradictory information,
- to analyze differences and similarities with experiences already made and issues already addressed before.

At this point we can assume some initial considerations:

- physical systems can function as a metaphor for the human consciousness and behavior.
- the similarities become more important than differences.
- It is therefore better to be open and flexible. As well as nature survives thanks to biodiversity, in fact when you close a way, nature has many other roads to choose from. Reminding us that it is essential to have a variety of ideas and approaches.
- It is false to think that biological systems tend toward a State of equilibrium and the presence of messy, unpredictable fluctuations, chaotic is attributable to external causes or pathological conditions, outstanding.
- for many years it was thought that these variations "chaotic" can be related to systems, introducing a new way of thinking and observe phenomena.
- chaos is more critical of the order. It is the most common situation in nature, while

the order is relatively rare and can be easily destroyed from the smallest perturbation.

- Therefore nature chooses to fight chaos with chaos, generating a multitude of life forms through random mutations.
- the chaos and disasters describe changes and SUDDEN STATE STEPS between situations of structural stability.
- the study of chaos allows us to know under what conditions the system will behave in a given way.
- it is on the external parameters of a system that eventually we can act and it is important to know, for example, how should we adjust these parameters to avoid the onset of chaos.

A great help may come from the following:

*"Complex systems tend to be located at a point that we will define the edge of chaos. Imagine this point as a place where there is enough to give vitality to the innovation system, sufficient stability to prevent it from falling into anarchy. It is an area of confusion and conflict where old and new collide ... "(Michael Crichton).*

Enterprises can be considered at the edge of chaos and disorganization. Success does not come from the stability and order: **innovation is generated at the edge of chaos.** In addition to creative disorganization we will adopt the strategic flexibility, sharing in decisions, organization and lifelong learning.

## **Conclusion**

- complex systems oscillate between the states: peace and disorder
- between the two states there is a margin in which you can operate with creative disorganization
- creative disorganization proposes new discoveries and innovations
- creative disruption requires us to abandon old practices

References:

- [La Teoria del Caos seconda parte](#)
- [La Teoria del Caos: l'Intuizione degli Artisti - Giugno 2004](#)
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