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STEFANO ARMENIA

THE VALUE OF SYSTEMS THINKING
AND SYSTEM DYNAMICS
IN THE MANAGEMENT OF
COMPLEX ORGANIZATIONS

A SELECTION OF CASE STUDIES

Preface by
Edoardo Mollona

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Preface

*Edoardo Mollona**

In *“The value of Systems Thinking and System Dynamics in the management of complex organizations”* the author constructs a theoretical and empirical journey into the management of complex organisations through the principles and theories of System Dynamics.

In the short introduction, the author provides the reasons for writing and reading such book. The theme of complexity is crucial nowadays when dealing with the most important and diffused challenges of our times. In this respect, system thinking provides a well-recognised method to deal with such complexity. Moreover, it also provides a mental and philosophical approach to these challenges. Therefore, the author aims to carefully describe the nuances of the discipline following the lessons of the founding fathers and to combine that with many empirical examples of real-world applications derived from his more than 20 years’ experience. The combination between a solid theoretical journey with the numerous case studies in the specific context of organisation management appears to be the strength of the book.

In chapter one, before diving into the specific SD matter, the author provides a general background on organisation theories. This background is outlined following an historical perspective, namely the most relevant theories are presented described and

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connected in a step-by-step fashion based on a chronological order. In the flow of the book, this section serves to create the context in which Systems Thinking (ST) and System Dynamics (SD) are born, developed and, specifically, are applied in the cases described in the book.

Chapter two represents the connecting point between the two theoretical domains discussed in the book: organisational management and ST/SD. The interconnections between the two are described, as well as how ST is posed within the organisation management domain. Specifically, the author presents why and how ST/SD is relevant for modern organisations and how those represent a fertile ground for applying ST/SD. By offering a rich repertoire of examples and citations, it is highlighted how concepts of both domains can support each other to provide an explanation for complex problems and to develop governance processes for informed decision-making in contemporary organisations.

In chapter three, Stefano Armenia shows how to handle with proficiency both the topics of Systems Thinking and System Dynamics. His long experience as modeller and as the chairman of the Italian System Dynamics Association emerges in his detailed analysis of the SD discipline. First, the 60-years history of the method is portrayed, starting from J.W. Forrester's first attempts at MIT. Then practical and interesting examples of the application of SD are described in order to provide the meaning and relevance of the methodology. Subsequently, the distinction between Systems Thinking and System Dynamics is described, as well as the overlapping between the two (i.e. shared principles). After that, more technical paragraphs are reported. First, the ST and SD specific concepts and modelling procedures and 'rituals' are outlined. Then, the possibility of participatory SD approaches and their introduction is given. Finally, the modelling techniques and analyses are described with very high details. Specifically, basic systemic behaviours, causal loop diagrams, system archetypes and stock and flow modelling.

The modelling experiences of the author are well described by the work presented in chapter four. The chapter contains five subsections. Each subsection collects a class of specific case studies in which the author applied SD. The five sections address, respectively, management of organisations, public policy, sustainability, security issues and education and training. Besides the use of SD, all the cases reported have in common that they highlight the importance of governance in complex systems (intended as the process that leads to a policy), as modern organisations are, and how SD can be a practical tool to support decision makers in their activities. The section constitutes a very useful and usable support for practitioners willing to understand how to apply Systems Thinking and System Dynamics to their organizational issues.

Finally, in chapter six, the author explores a new framework – the Smart Model-based Governance approach – which proposes to advance to the ‘next’ level the process of managing complex organizations. This approach integrates principles from IT, SD and cybernetics in the attempt to develop a new method of governance that benefits from the synergies generated within the three domains. The new approach is expected to be more efficient, ‘aware’ of complexity and implementable.

Overall, I suggest, the book is a very enjoyable companion to tackle problems of organizations and it reminds us of the importance of recognizing the system structure of challenging issues. In our activity, every day, we are embedded in complex systems but we are not used to recognise them. Neither have we adequate conceptual tools to analyse the way in which our decisions and actions are influenced by the structure of the system in which we are embedded, not to say “captured”!

Specifically, organizations are complex webs of decisions involving a variety of resources and operators. Thus, Systems Thinking is a prerequisite to create a good strategy. Systems Thinking is about developing appropriate mental models to in-

interpret dynamic interplay among people, decisions and resources. The mental model ought to help decision-makers to capture the deep causal structure that generates events and phenomena thereby foreseeing long-term consequences of decisions and actions.

When Systems Thinking is associated to System Dynamics, which implies the translation of qualitative models into formal models to be simulated with a computer, the value added to support decision-making amplifies even further. Brainstorming following the simulation of models provides the ground to rationalise on blind spots and difficulties that decision-makers face in complex dynamic systems. Experience with simulation allows decision-makers to interpret, under a systemic perspective, the dynamics of organizations as well as dilemmas originating from contemporary management of complex webs of resources.

In this light, a rich body of SD literature concerns the use of computer models as learning laboratories to guide the interpretation of the relationships between a feedback structure and the emerging behaviour produced by that structure. In the book, this tradition is revived and applied to contemporary management issues such as security, sustainability, learning and education.

Therefore, my opinion is that a book that elicits the possible relationships among the study of organizations, Systems Thinking and System Dynamics is welcome to enrich the panoply of conceptual tools available to managers willing to design robust organizations.

In particular, this book scores three important results. First, the author clearly describes the connection between Systems Thinking and System Dynamics and the gains from combining the two approaches. Second, Stefano Armenia offers a vivid representation of the implementation of the approaches by a rich selection of cases. Finally, the use of ST/SD is clearly embedded into organizational and managerial disciplines and offers a good blend of practitioner's acumen and academic background.

For the above mentioned reasons, I recommend this book both to practitioners willing to enrich their conceptual and methodological toolkit as well as to researchers aiming at fortifying their repertoire of methodological skills aimed at addressing the study of complex problems.

Eventually this book follows the recent Italian edition (edited by Luigi Maria Sicca) of Peter Senge's *Classical, The Fifth Discipline*, within *puntOorg International Research Network*, thus testifying that the SD can offer a wide contribution to the literature of Business Organization and HR management.

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