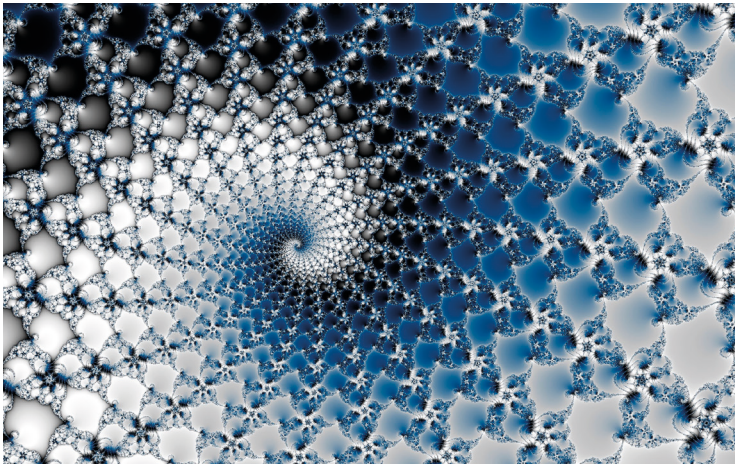


Project Management

Driving Complexity PMI® Italian Academic Workshop

edited by

Fabio Nonino, Alessandro Annarelli, Sergio Gerosa
Paola Mosca, Stefano Setti



Collana Convegni 43

SCIENZE E TECNOLOGIE

Project Management

Driving Complexity

PMI® Italian Academic Workshop

edited by

*Fabio Nonino, Alessandro Annarelli, Sergio Gerosa
Paola Mosca, Stefano Setti*



SAPIENZA
UNIVERSITÀ EDITRICE

2018



In collaboration with the PMI® Italy Chapters.

Copyright © 2018

Sapienza Università Editrice

Piazzale Aldo Moro 5 – 00185 Roma

www.editricesapienza.it

editrice.sapienza@uniroma1.it

Iscrizione Registro Operatori Comunicazione n. 11420

ISBN 978-88-9377-086-6

Pubblicato a settembre 2018



Quest'opera è distribuita
con licenza Creative Commons 3.0
diffusa in modalità *open access*.

In copertina: <https://pixabay.com/it/mandelbrot-frattale-astratto-1009704/> (CC0 Creative Commons.
Libera per usi commerciali, attribuzione non richiesta).

Contents

Introduction	1
PART I – PM(BOK) THEORY EVOLUTION	
1. Unveiling the complexity of PMBOK through process network analysis	5
2. The PMBOK standard evolution: leading the rising complexity	11
3. Towards Dissecting Start Up Complexity: a Project Management Point of View	17
PART II – TEACHING AND LEARNING PROJECT MANAGEMENT COMPETENCES	
4. Teaching technical and behavioural competences in project management	31
5. The role of Junior Project Manager in Project Management: requirements, certifications and training opportunities	35
6. Project Management and Project Complexity at Top Business Schools	41
7. Experiencing Project management Teaching using Business Games: the Warwick Business School Case Study	47
PART III – INNOVATIVE TRENDS IN PROJECT MANAGEMENT	
8. Fostering innovation in infrastructure projects through Public Private Partnerships	55

9. Project Management Trends in the Automotive Supply Chain	61
10. Managing Innovation in a complex environment: Hospital 4.0	67
PART IV – ORGANIZATIONAL LEARNING FOR DRIVING COMPLEXITY	
11. Investigating project complexity from an organisational learning perspective: a multiple case study	73
12. Facing project complexity by Advanced Work Packaging: an application in Benetti Yachts	79
13. Explorative and Exploitative Learning in Infrastructure Megaproject: a case from the Hong Kong-Zhuhai-Macao Bridge	87
PART V – PORTFOLIO, PROGRAM AND PROJECT COMPLEXITY	
14. Beyond PPM: On the way to modernization at Italian National Institute of Statistics	93
15. Program Governance across enterprises helps govern complexity and creates values across multiple enterprises in a win-win approach	97
16. The Development Of Door-To-Door Integrated Mobility In The Metropolitan Cities: The Case Study Of The Roma-Lido Line	105
PART VI – MODELLING AND ASSESSING COMPLEX PROJECTS	
17. Analysing management effectiveness and project performance through a system dynamics approach: the case of software development projects	113
18. Formal Requirements Modeling: the tipping point of requirements engineering	125
19. Improving the integration between BIMs and Agent-Based Simulations: the Swarm Building Modelling – SBM	131
PART VII – MANAGING RISK AND RESILIENCE OF COMPLEX PROJECTS	
20. How to address the uncertainty complexity: a new method for the contingency reserve calculation	139

21. Favours resilience in increasingly complex environments. Development of an adaptive approach for Large Engineering Projects Management	145
22. Project risk management in complex socio-technical systems: A resilience perspective	151
PART VIII – COMPLEXITY OF PROJECT VALUE ASSESSMENT	
23. A Real Options Model to Project Management	159
24. How to estimate Project Value? A literature review and a multidimensional index proposal	165
25. Building a Project Mindset: A Canvas for Managing Project Complexity	169
List of Authors	177
Participating Institutions	179

21. Favouring resilience in increasingly complex environments. Development of an adaptive approach for Large Engineering Projects Management

Franca Cantoni, Edoardo Favari

No contemporary organization is sheltered against complexity (Weick and Sutcliffe, 2001; Cunha and Cunha, 2006). In addition, all the organizations' perception is that the level of complexity is increasing. (PMI, 2013). As Giustiniano and Cantoni (2017) state: "Contemporary organizations are increasingly asked to deal with high levels of environmental uncertainty, complexity and equivocality, struggling not only with strong competitive pressures but also with increasing uncertainty related to socio-political and economic trends. When organizations and their members are confronted with crises, economic distress and 'ugly' surprises, resilience is crucial to their survival. In this sense, promoting resilience has become a major strategic concern for organizations." To face crisis and instability in a complex, polymorphic and competitive context, enterprises need a new perspective being able to combine the "company-centric" logic, in which efficiencies are the highest priority, with the "customer-centric" one, wherein the structure and behaviour of the whole enterprise cannot neglect consideration of full knowledge of the various customer segments (internal and external) with which it interacts. Given these premises, to face this environmental instability and complexity, working for projects and in teams is nowadays habit (Martone et al., 2018). Indeed, workers are constantly asked to manage a higher number of simultaneous and even more complex and complicated projects to satisfy and retain demanding clients with higher expectations in terms of service quality (Ayres, 2010) and thus ensuring success.

The need for "adaptive" methods for managing projects, in con-

trast to the traditional “predictive (waterfall)” ones, has arisen since the 90’s in the software industry and its milestone is the “Agile Manifesto” published in 2001 (PMI, 2001). In these years several methods to manage agile projects have been developed (Schwaber 1995; DeCarlo, 2004; Augustine, 2005) and this trend helped the predictive methods to evolve (PMI, 2017) (including agile methodologies into waterfall project life cycle).

Starting from this picture, it is clear that there is a strong demand for methodologies enabling organizations to face complexity through adaptive methodologies (Miller, Lessard, 2000).

Currently available adaptive project management techniques have demonstrated, along more than two decades of application, to be critically more effective than the predictive ones in the very specific field of software development; in the last ten years these adaptive techniques have been extended to several others fields, such as R&D or organizational change projects. Today it is generally accepted that a project managed by predictive techniques could also include agile methodologies in some minor part (PMI, 2017), but the most of large engineering projects still have no options than applying a predictive life cycle. At the same time, Large Engineering Projects (LEPs) are facing increasing complexity and uncertainty, so that the application of predictive techniques is even tougher, and the need for adaptive methodologies in this field of project management is stronger than ever. Resilience – here intended as the process followed to anticipate, respond, adapt to, and/or rapidly recover from a disruptive event (Mallak, 1997, 1998; Vogus & Sutcliffe, 2007) - is increasingly becoming an essential feature for organizations involved in large engineering projects. The Authors of this work strongly believe that new adaptive project management techniques are currently essential to practitioners to favour resilience in their upcoming projects.

In this sense, the research is addressed at understanding how adaptive project management techniques, beyond agile, can support and favour organizational resilience in increasingly complex environments such as Large Engineering Projects (LEPs)

Our hypotheses are here illustrated:

H1: Agile and adaptive project management techniques (currently available) can help resilience in software projects and in several other fields (R&D, organization change, design, etc.) but can’t be helpful

for LEPs Management facing complexity and uncertainty

H2: Complexity features faced by Large Engineering Projects requires different approaches than the one in the boundary of agile projects (due basically to the dimension of LEPs in terms of economic value, effort and duration, variety of stakeholders involved and their geographical distribution, the nature of their deliverables, the nature of standard international contracts for these projects (eg. FIDIC books....))

H3: It is possible to improve organizational resilience by operating on macro and micro features, so that making the organization adaptive to emerging uncertainty.

Design/methodology/approach

The Authors started sharing their experience in management, resilience and in project management both at academic and practical level, comparing literature and their own previous works concerning complexity and uncertainty environment. In particular, comparison have been made between the organizational theory for resilient organization (Giustiniano & Cantoni, 2017) and the self-organizing teams in project management according to social network analysis theory applied to complex project environment (Favari, 2012; Favari, 2013). The Authors take into account the epistemological problem on investigating complexity, which requires the observer not to be external to the phenomenon, but to be part of it, and the multilevel approach that must be able to connect together contradictory experiences to logic systems. (Morin, 2008).

Findings

This study points out that to make an organization resilient and adaptive to continuous and unexpected environmental change, effort must be made to develop adaptive techniques, in addition to agile techniques, to manage Large Engineering Projects.

Originality/value

This work investigates a field of project management that still has no strong and comprehensive methodology: adaptive (resilient) project management approach to industry and construction projects with increased complexity environment. The result includes overpassing the system theory models in describing complexity, opening to new approaches. In fact, *“although system theory covers the main features of an organization, it is still too generic and not sufficiently exhaustive and accurate to explain and interpret resilient organizations. Managerial theories, individually considered, are not able to explain resilience. In fact, none of them is able to deal with the phenomenon of resilience and all its behavioural and structural features. Instead, theories from other fields can better cope with the phenomenon itself, and with its implications for behaviours and structures.”* (Giustiniano & Cantoni, 2017).

Practical implications

The paper already include recommendation that can be immediately applied to project management teams and their organizations in order to improve their response to complexity issues and to make them resilient to uncertainty and emerging problems.

Research limitations/implications

This paper represents the preliminary work of a huge research program. In the following stages the Authors are cooperating with industrial organizations on their project management team to find quantitative indicators to refine and validate their current findings.

References

- Ayres J.B. (2010). *Supply chain project management. A structured collaborative and measurable approach* (2nd ed). Boca Raton, FL: CRC Press.
- Augustine, S. (2005), *Managing Agile Projects*, Prentice Hall PTR
- Cunha, M. P. & Cunha, J.V. (2006). *Towards a complexity theory of strategy. Management Decision*, 44(7), 839-850.

- DeCarlo, D. (2004), *Extreme Project Management*, Jossey-Bass
- Favari, E. (2013), *Large Transportation Projects Management, a non-linear approach*, Politecnico di Milano
- Favari, E. (2012), *Reducing complexity in urban transportation projects*, Elsevier-Procedia, Social and Behavioral Sciences
- Giustiniano, L., Cantoni, F., (2017), “*Between Sponge and Titanium: Designing micro and macro features for the resilient organization*”, Learning and Innovation in Hybrid Organizations, Palgrave
- Mallak, L.A., (1997). *How to build a resilient organization*. In Proceedings of the Industrial Engineering Solutions 1997 Conference, pp. 170–177, Miami, May.
- Mallak, L.A. (1998). *Putting organizational resilience to work*. Industrial Management 40(6): 8–13.
- Martone, A., et al., (2018), *Smart working, job crafting, virtual team, empowerment : (progettazione delle posizioni lavorative, nuove soluzioni organizzative, esempi di applicazione)*, Wolters Kluwer Italia
- Miller, R., Lessard, D.R. (2000), *The Strategic Management of Large Engineering Projects*, Massachusetts Institute of Technology
- Morin, E. (2008), *On complexity*, Hampton Press
- Schwaber, K. (1995), *SCRUM Development Process*, OOPSLA '95 Workshop Proceedings, Springer-Verlag London
- Vogus, T.J., & Sutcliffe, K.M. (2007). *Organizational resilience: towards a theory and research agenda*. In Systems, Man and Cybernetics, 2007. ISIC. IEEE International Conference, pp. 3418– 3422, October, IEEE
- Project Management Institute. (2001), *Agile Manifesto for software development*, <http://agilemanifesto.org/>
- Project Management Institute. (2013), *PMI's Pulse of the Profession In-Depth Report: Navigating Complexity*.
- Project Management Institute. (2017), *A Guide to the Project Management Body of Knowledge – 6th edition*. Newtown Square, Pa: Project Management Institute.
- Weick, K.E. & Sutcliffe, K. (2001). *Managing the Unexpected: Assuring high performance in an age of complexity*, Jossey Bass, San Francisco, CA.