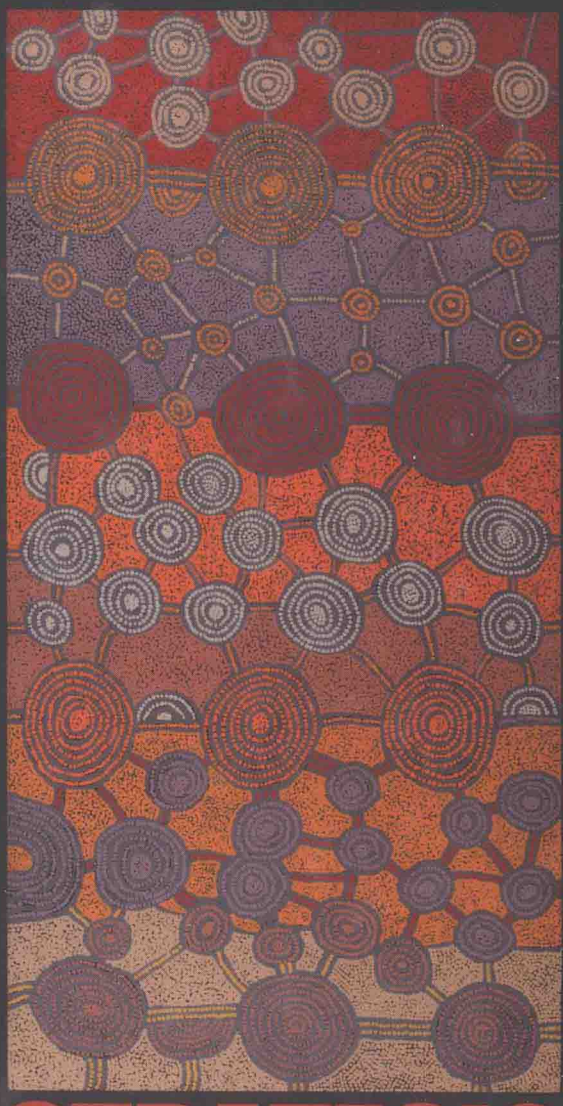

# STRATEGIC MANAGEMENT OF INNOVATION NETWORKS

MÜGE ÖZMAN

# Strategic Management of Innovation Networks

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CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE
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University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

4843/24, 2nd Floor, Ansari Road, Daryaganj, Delhi - 110002, India

79 Anson Road, #06-04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781107071346
10.1017/9781107775534

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First published 2017

Printed in the United Kingdom by Clays, St Ives plc in 2017

*A catalogue record for this publication is available from the British Library.*

*Library of Congress Cataloging in Publication Data*
Names: Özman, Müge, author.
Title: Strategic Management of Innovation Networks Affiliation / Müge Özman, Institut Mines-Telecom, Télécom École de Management France.
Description: Cambridge, United Kingdom ; New York, NY, USA : Cambridge University Press, 2017. | Includes bibliographical references and index.
Identifiers: LCCN 2016035037| ISBN 9781107071346 (Hardback) | ISBN 9781107416796 (Paperback)
Subjects: LCSH: Cooperative industrial research. | Research, Industrial–Management. | Personnel management. | Creative ability in business. | Strategic planning. | BISAC: BUSINESS & ECONOMICS / Entrepreneurship.
Classification: LCC T175.5 .O96 2017 | DDC 658/.046–dc23 LC record available at https://lccn.loc.gov/2016035037

ISBN 978-1-107-07134-6 Hardback
ISBN 978-1-107-41679-6 Paperback

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# Preface

The cover illustration of this book shows a detail from a piece of indigenous Australian art. Traditionally, Aboriginal artists used a variety of symbols in their paintings, many of which represent natural features, like water flows, hills or rock holes. These paintings were sometimes used as maps, giving travellers information about the landscape. In a way, networks in the modern economy are similar to these works of art, in the sense that they show the distribution of resources and power, the organisation of work or the flow of knowledge between actors. Networks give a bird's-eye view of different industrial or organisational landscapes.

Networks are important to innovation because innovation is a social and collective process that involves a wide range of actors and the interactions between them. This importance is reflected in the contemporary literature on networks and innovation, where research crosses disciplinary boundaries, bringing insights from sociology, economics, management, organisation theory, physics, geography and psychology. This makes for a rich variety of inputs but it also represents a challenge in finding a common language to bridge them. The aim of this book is to provide that bridge and to improve our understanding of how networks function inside and outside organisations, their implications for different aspects of the innovation process, and how they form and evolve. This book has a wide, cross-disciplinary scope supported by suggestions for further reading for those who want to explore any of the topics more extensively.

While the literature on innovation networks has grown steadily over the last three decades, the implications of this research for managing innovation have been less visible. This is surprising, given the many ways in which a good understanding of networks can help manage innovation, for example by fostering creativity, leveraging partnerships for learning, selecting partners, managing organisational change, sponsoring technologies or novelties in the market, and managing supplier relations.

The management of innovation networks benefits an organisation in two ways. First, it enables informed interventions in networks – like partner selection and team formation – that help an organisation obtain a strategically privileged position in accessing critical resources and capabilities for innovation. Second, and more indirectly, understanding the networks within and surrounding organisations helps to improve the effectiveness of many aspects of innovation management. For example, understanding the distribution of knowledge inside a firm can be highly relevant; social network analysis techniques can be used to map the nature of the knowledge base.

This book has been written for graduate or advanced undergraduate students, practitioners and researchers in the fields of social networks and innovation. It is a practical, action-oriented guide to managing the innovation process through a network perspective, based on important theoretical results. It provides a comprehensive view of networks and demonstrates how the concepts and techniques of the social network perspective work in practice. It also reviews new insights in emerging fields, explores major debates and provides succinct but comprehensive coverage of diverse topics in the field.

In this book I take an evolutionary approach to two sides of the innovation process: search and selection. Search activities are related to generating innovation, while selection processes are related to promoting and diffusing novelties. During search, networks help to recognise opportunities, create, learn, explore and ultimately generate innovations in a system. With selection, networks affect the way people influence others and are influenced by them, choose between alternatives or provide insights in sponsoring novel projects.

The first part of the book is introductory, with each chapter dedicated to one aspect of an innovation network. Chapter 1 explains the meaning of innovation networks and introduces the innovation network box, which is composed of three dimensions: the purpose of network management, the type of networks that fit the purpose and what social network metrics to apply (Figure 0.1). Chapter 2 explores the nature of innovation and why a network approach is relevant to understanding and managing it. The search and selection processes are explained in detail in this chapter. In Chapter 3 I introduce networks as nested systems, composed of teams, departments, business units, firms and industries, in increasing order of aggregation. I also distinguish between different network levels, for example, inter-organisational, intra-organisational and market. Chapter 4 looks at the types of data and social network analysis techniques used to analyse innovation

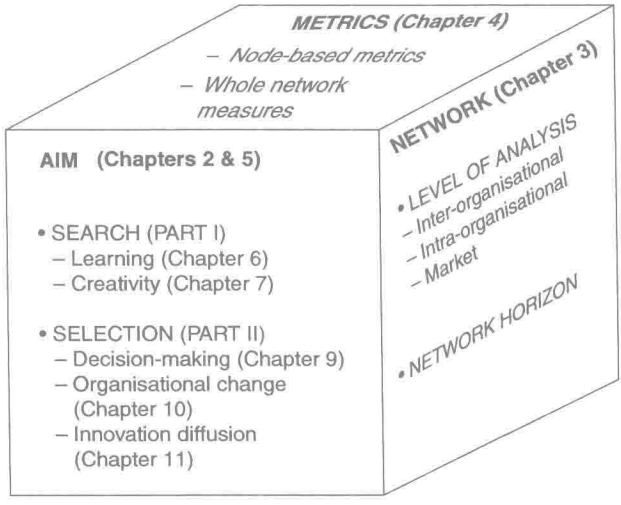


**Figure 0.1** Innovation Network Box and the Planning of the Book

networks for different purposes and explores major debates in social network theories. In Chapter 5 I investigate the scope, aims and benefits of network management and introduce a practical guide for managing innovation networks, including critical parameters.

Part II explores the role of networks in search activities. In Chapter 6, I explain how the exploration and exploitation dimensions of organisational learning are related to alliances, alliance portfolios and networks. Chapter 7 focuses on creativity and networks. I look at creativity as both an individual attribute and a social process in which the functioning of teams, and the structure of the broader network, are significant. Chapter 8 examines the role of modularity, an important aspect of new product development that has implications for the effective management of relations between teams and between firms. In this chapter, I also look at the role of networks in user innovation.

Part III explores the role of networks in selection. In Chapter 9 I examine how networks act as signals when selecting among different innovation projects (venture capital decisions or building coalition and obtaining support and resources in intrapreneurial activities). In this chapter, I also review cognitive biases that may be rooted in networks and influence managerial decision-making. Chapter 10 focuses on how the social network approach helps in change management. What does the structure of an organisation's informal networks reveal about possible resistance to change? What will

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post-change networks look like? Who are the most likely influentials who will help build coalition? Chapter 11 explores the classic literature on social networks and diffusion and more recent approaches. How do ideas and innovations spread on online social media? Who are the influential people, and how do we find them? What does the structure of social network platforms reveal about the patterns of influence and diffusion between people?

The fourth and final part of the book explores the hinterland of network evolution. Chapter 12 is concerned with the antecedents of tie formation and dissolution within inter-personal and inter-organisational networks. I explore mechanisms like the role of individual attributes (experience, knowledge, personality), dyadic attributes (similarity, proximity, etc.) and past networks. Building on the insights developed in Chapter 12, Chapter 13 explores network evolution. Some structural regularities in real-world networks are explained, as well as the factors that drive their emergence and evolution, including important events, firms' strategies, institutional, technological and market-related factors and the interrelations between them.

Finally it is important to mention that the network approach in innovation is a relatively young field, yet it is growing fast. While in just one or two decades much work has been done in terms of research, there is still much to be done in the future, not only in terms of research, but also to translate theoretical findings into action-oriented guides. I hope that this book serves as a useful source in this sense.

# Acknowledgements

I have had useful feedback from and the support of many colleagues and friends in writing this book. In particular, I thank my colleagues in Télécom Ecole de Management, and in particular Madeleine Besson and the KIND Research group for their support, as well as useful discussions in seminars. In addition I would like to mention UNU-MERIT (United Nations University-Maastricht Economic Research Institute on Innovation and Technology) where I started my studies on innovation and networks. Their deep expertise in innovation, together with a very collaborative and friendly environment, was an important beginning for me, which motivated me in my later research as well. I consider myself very lucky to have had the chance to work with Robin Cowan, who was very influential in my interest in networks, as well as Patrick Llerena, from the University of Strasbourg (BETA), with whom our joint research projects were always a source of motivation. Teoman Pamukçu, Erkan Erdil, Semih Akçomak from TEKPOL in Middle East Technical University (Ankara), as well as Bulat Sanditov, Altay Özaygen, and Cédric Gossart from Télécom Ecole de Management were especially helpful in providing corrections and help in the text. My conversations with John Bessant, Martin Kilduff, Pascal Le Masson and Geert Duysters about this book encouraged me to a large extent in this project and gave new ideas. In addition, the case studies conducted in the context of the project Better Business Models (BBM) funded by the Agence National de la Recherche (ANR), and our project meetings were very useful in gaining new insights about many practical aspects of network management by firms. I also warmly thank this book's Commissioning Editor Paula Parish, as well as Stephen Acerra and Dominic Stock at Cambridge University Press, for their interest in this project, useful feedbacks and support, and Sally Simmons from Cambridge Editorial for her assistance with the editorial process. Last, but not least, there is my family. I am grateful to my mother Dalga Özman

and my sister Aylin Özman for being always there for me and for their endless support and love. I thank my partner Cédric and my son Léo Ege for maintaining a cheerful and motivating environment around me during the process of writing this book.

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