



EDITED BY

**BENT
FLYVBJERG**

≡ The Oxford Handbook of
**MEGAPROJECT
MANAGEMENT**

The Oxford Handbook of MEGAPROJECT MANAGEMENT

The Oxford Handbook of Megaproject Management provides state-of-the-art scholarship in the emerging field of megaproject management.

Megaprojects are large, complex projects which typically cost billions of dollars and impact millions of people, like building a high-speed rail line, a megadam, a national health or pensions IT system, a new wide-body aircraft, or staging the Olympics.

The book contains 25 chapters written especially for this volume, covering all aspects of megaproject management, from front-end planning to actual project delivery, including how to deal with stakeholders, risk, finance, complexity, innovation, governance, ethics, project breakdowns, and scale itself. Individual chapters cover the history of the field and relevant theory, from behavioral economics to lock-in and escalation to systems integration and theories of agency and power. All geographies are covered—from the US to China, Europe to Africa, South America to Australia—as are a wide range of project types, from “hard” infrastructure to “soft” change projects. In-depth case studies illustrate salient points.

The *Handbook* offers a rigorous, research-oriented, up-to-date academic view of the discipline, based on high-quality data and theory. It will be an indispensable resource for students, academics, policymakers, and practitioners.

OXFORD
UNIVERSITY PRESS

www.oup.com

ISBN 978-0-19-873224-2

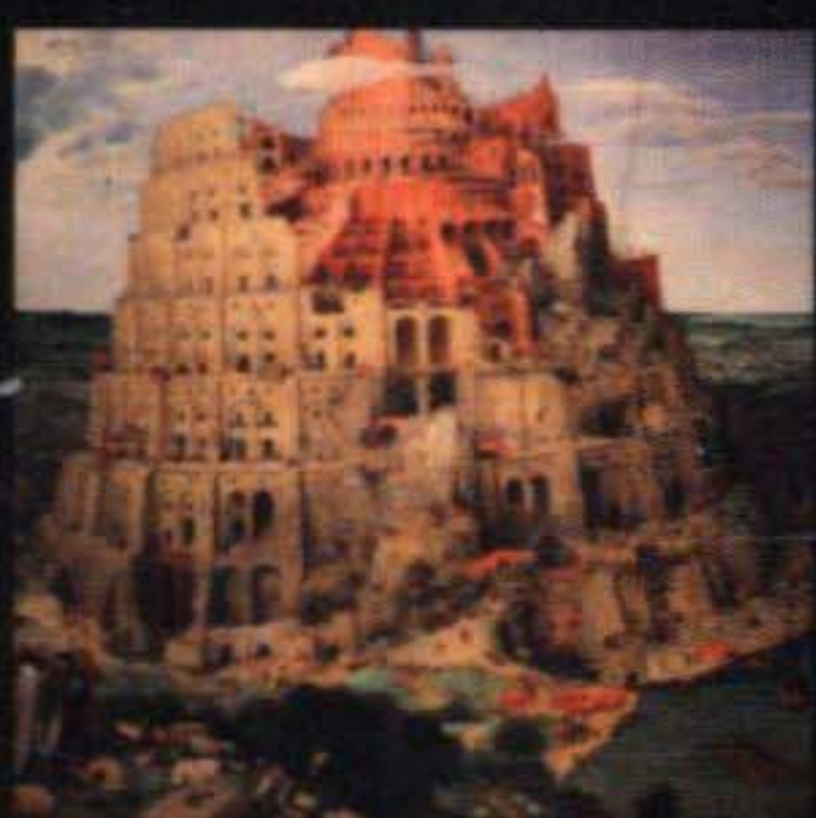


9 780198 732242

Flyvbjerg

The Oxford Handbook of

MEGAPROJECT
MANAGEMENT



OXFORD

THE OXFORD HANDBOOK OF

MEGAPROJECT

MANAGEMENT

Edited by
BENT FLYVBJERG

OXFORD
UNIVERSITY PRESS

OXFORD
UNIVERSITY PRESS

Great Clarendon Street, Oxford, OX2 6DP,
United Kingdom

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship,
and education by publishing worldwide. Oxford is a registered trade mark of
Oxford University Press in the UK and in certain other countries

© Oxford University Press 2017

The moral rights of the author have been asserted

First Edition published in 2017

Impression: 2

All rights reserved. No part of this publication may be reproduced, stored in
a retrieval system, or transmitted, in any form or by any means, without the
prior permission in writing of Oxford University Press, or as expressly permitted
by law, by licence or under terms agreed with the appropriate reprographics
rights organization. Enquiries concerning reproduction outside the scope of the
above should be sent to the Rights Department, Oxford University Press, at the
address above

You must not circulate this work in any other form
and you must impose this same condition on any acquirer

Published in the United States of America by Oxford University Press
198 Madison Avenue, New York, NY 10016, United States of America

British Library Cataloguing in Publication Data
Data available

Library of Congress Control Number: 2017933991

ISBN 978-0-19-873224-2

Printed and bound by
CPI Group (UK) Ltd, Croydon, CRO 4YY

Links to third party websites are provided by Oxford in good faith and
for information only. Oxford disclaims any responsibility for the materials
contained in any third party website referenced in this work.

THE OXFORD HANDBOOK OF

**MEGAPROJECT
MANAGEMENT**

LIST OF CONTRIBUTORS

Rhodante Ahlers is an Independent Researcher

Atif Ansar is Lecturer at the Blavatnik School of Government, University of Oxford

Robert A. Baade is the A. B. Dick Professor of Economics and Business at Lake Forest College in Lake Forest, Illinois

Karen Bakker is a Professor, Canada Research Chair, and Founding Director of the Program on Water Governance at the University of British Columbia

Chris Biesenthal is a Senior Lecturer at the School of the Built Environment at the University of Technology, Sydney

Alexander Budzier is a Business Development Manager at the Saïd Business School, University of Oxford

Demi Chung is a Senior Lecturer and Undergraduate Studies Coordinator at the University of New South Wales

Stewart R. Clegg is a Professor in the University of Technology Sydney Business School. He is also a Strategic Research Adviser, Newcastle University Business School, UK, and a Visiting Professor, School of Business and Economics, Universidade Nova, Lisbon, Portugal

Andrew Davies is Professor in the Management of Projects, The Bartlett Faculty of the Built Environment, University College London

Gerardo del Cerro Santamaría is Research Professor of Planning and Megaprojects at The Cooper Union for the Advancement of Science and Art in Manhattan

Mark Dodgson is Director of the Technology and Innovation Management Centre at the University of Queensland Business School

Helga Drummond is a Professor of Decision Sciences in University of Liverpool Management School and Visiting Professor of Business, Gresham College London

Bent Flyvbjerg is the BT Professor and inaugural Chair of Major Programme Management at the University of Oxford

David M. Gann is the Vice-President (Development and Innovation), Imperial College London

Nuno Gil is Academic Director at the Centre for Infrastructure Development, Manchester Business School

Carsten Greve is Professor of Public Management and Governance, Copenhagen Business School

Graeme Hodge is a professor of Public Policy in the Law Faculty at Monash University

Vered Holzmann Coller School of Management, Tel Aviv University

Sylvain Lenfle a professor of Innovation Management at the Conservatoire National des Arts et Métiers (CNAM) in Paris and associate researcher at the Centre de Recherche en Gestion (CRG), Ecole Polytechnique, France

Donald Lessard is the Epoch Foundation Professor of International Management, Emeritus at the MIT Sloan School of Management

Raymond E. Levitt is Professor of Civil and Environmental Engineering and Director of the Center for Global Projects (CGP) at Stanford University

Christoph Loch is a Professor and the Director of Cambridge Judge Business School at the University of Cambridge

Daniel Lunn is an Emeritus Fellow in the Department of Statistics, University of Oxford

Victor A. Matheson is Professor of Economics at the College of the Holy Cross

Benjamin Melamed is Distinguished Professor at Rutgers Business School

Roger Miller École EMD, Aix-Marseille

Julien Pollack is the Senior Lecturer at the School of the Built Environment, University of Technology

Hugo Priemus is Professor Emeritus System Innovation and Spatial Development, Delft University of Technology

Xuefei Ren is an Associate Professor of Sociology and Global Urban Studies, Michigan State University

Vivek Sakhrani is a PhD candidate and researcher at the Massachusetts Institute of Technology, and CPCS Transcom Inc

Knut Samset is Professor of Project Management at the Faculty of Engineering Science and Technology, Norwegian University of Science and Technology

Shankar Sankaran is Professor of Organizational Project Management at the School of the Built Environment, University of Technology Sydney

W. Richard Scott is Emeritus Professor of Sociology at Stanford University

Thayer Scudder is Emeritus Professor of Anthropology, California Institute of Technology

Aaron Shenhar is Professor of Project and Technology Management, CEO, The SPL Group and TLI

Matti Siemiatycki is an associate professor of Geography and Planning at the University of Toronto

Janis van der Westhuizen is an Associate Professor, Stellenbosch University

Bert van Wee is Professor in Transport Policy at Delft University of Technology

Roger Vickerman is the Dean for Europe and Professor of European Economics at the University of Kent

Gro Holst Volden is a Research Director for the Concept Research Program, Norwegian University of Science and Technology

Graham Winch is Professor of Project Management, Manchester Business School, University of Manchester

Yao Zhao is Professor and Department Vice Chair, Rutgers Business School, Rutgers University

Margreet Zwarteveen is Professor of Water Governance, UNESCO-IHE

CONTENTS

.....

<i>List of Illustrations</i>	ix
<i>List of Tables</i>	xi
<i>List of Contributors</i>	xiii

1. Introduction: The Iron Law of Megaproject Management	1
BENT FLYVBJERG	

PART I CHALLENGES

2. Has Megaproject Management Lost Its Way? Lessons from History	21
SYLVAIN LENFLE AND CHRISTOPH LOCH	
3. Cycles in Megaproject Development	39
MATTI SIEMIATYCKI	
4. Big Is Fragile: An Attempt at Theorizing Scale	60
ATIF ANSAR, BENT FLYVBJERG, ALEXANDER BUDZIER, AND DANIEL LUNN	
5. Institutional Challenges and Solutions for Global Megaprojects	96
RAYMOND E. LEVITT AND W. RICHARD SCOTT	
6. Megaproject Decision Making and Management: Ethical and Political Issues	118
BERT VAN WEE AND HUGO PRIEMUS	
7. Biggest Infrastructure Bubble Ever? City and Nation Building with Debt-Financed Megaprojects in China	137
XUEFEI REN	

PART II CAUSES

8. Did Megaproject Research Pioneer Behavioral Economics? The Case of Albert O. Hirschman	155
BENT FLYVBJERG	

9. Megaproject Escalation of Commitment: An Update and Appraisal 194
HELGA DRUMMOND
10. Megaprojects as Games of Innovation 217
ROGER MILLER, DONALD LESSARD, AND VIVEK SAKHRANI
11. Power and Sensemaking in Megaprojects 238
STEWART R. CLEGG, SHANKAR SANKARAN, CHRIS BIESENTHAL,
AND JULIEN POLLACK
12. A Collective-Action Perspective on the Planning of Megaprojects 259
NUNO GIL
13. Understanding Drivers of Megaevents in Emerging Economies 287
ROBERT A. BAADE AND VICTOR A. MATHESON

PART III CURES

14. Innovation and Flexibility in Megaprojects: A New Delivery Model 313
ANDREW DAVIES, MARK DODGSON, AND DAVID M. GANN
15. Megaproject Stakeholder Management 339
GRAHAM WINCH
16. Private Finance: What Problems Does It Solve, and How Well? 362
GRAEME HODGE AND CARSTEN GREVE
17. Wider Impacts of Megaprojects: Curse or Cure? 389
ROGER VICKERMAN
18. Quality Assurance in Megaproject Management: The
Norwegian Way 406
GRO HOLST VOLDEN AND KNUT SAMSET
19. The Good Megadam: Does It Exist, All Things Considered? 428
THAYER SCUDDER

PART IV CASES

20. Cracking the Code of Megaproject Innovation: The Case
of Boeing's 787 453
VERED HOLZMANN, AARON SHENHAR, YAO ZHAO,
AND BENJAMIN MELAMED

21. The Power of Systems Integration: Lessons from London 2012 ANDREW DAVIES	475
22. Iconic Urban Megaprojects in a Global Context: Revisiting Bilbao GERARDO DEL CERRO SANTAMARÍA	497
23. Private Provision of Public Services: The Case of Australia's Motorways DEMI CHUNG	519
24. Megaprojects as Political Symbols: South Africa's Gautrain JANIS VAN DER WESTHUIZEN	539
25. Large Dam Development: From Trojan Horse to Pandora's Box RHODANTE AHLERS, MARGREET ZWARTEVEEN, AND KAREN BAKKER	556
<i>Index</i>	577

LIST OF ILLUSTRATIONS

1.1	Size of selected megaprojects, measured against GDP of selected countries	3
2.1	When to choose trial-and-error-learning or selectionism	31
3.1	S-curve of innovation adoption	41
3.2	Number and type of Major League baseball stadiums constructed, 1860–2010	44
3.3	Global development of super-tall skyscrapers	46
3.4	Boom and bust: opening of new nuclear reactors worldwide	50
4.1	A map of fragility	65
4.2	Graphing “investment fragility”	68
4.3	Sample distribution of 245 large dams across five continents (1934–2007)	72
4.4	Density trace of actual/estimated cost (costs overruns) in constant local currency terms	73
4.5	Density trace of schedule slippage with the median and mean	74
4.6	Location of large dams in the sample and cost overruns by geography	79
4.7	An aspiration to investment robustness in the Guavio hydroelectric project	81
4.8	Cumulative fragility: erosion near the foundation of Kariba Dam wall	83
4.9	Inaccuracy of cost estimates (local currencies and constant prices) for large dams over time (1934–2007)	84
5.1	Involvement level of key actors in SR91X at critical events over the course of development	109
8.1	Box plots of cost risk and benefit risk 1920–2011	179
10.1	Project shaping	222
10.2	Shaping as a sequence of options	227
10.3	An megaproject value tradespace with many possible design options	228
12.1	Stylized representation of different infrastructure design structures	266
12.2	Excerpts of the design structure matrices and companion organizational matrices for the London Olympic Park and HS2 cases	268
12.3	Sustaining highly fragile consensus-oriented developments	273
14.1	Balancing routines and innovation in megaprojects	322

14.2	Balanced response to uncertainty	322
16.1	The European PPP market by value and number of projects since 2005	366
18.1	The Norwegian quality-at-entry regime for major public investment projects	408
18.2	Stochastic cost estimation: definition of key terms	417
18.3	Deviation between the final cost and the cost frame approved by Parliament	418
18.4	Number of projects with cost overruns and savings by sector	419
18.5	Deviations between the final cost and the approved cost frame at the time of commissioning for the project	420
18.6	Deviation between the final cost and the agreed steering frame for the project	421
20.1	The Diamond of Innovation model	461
20.2	The Dreamliner's Diamond of Innovation	464
21.1	London 2012 Olympics: Program, projects, and systems	484
25.1	Construction of dams by decade during the twentieth century	562
25.2	Change in monthly downstream flows owing to Aswan High Dam	564
25.3	Financial flows in dam building	566