

**INNOVATION
MANAGEMENT AND
NEW PRODUCT
DEVELOPMENT
FOR ENGINEERS**

SUPPLEMENT

VOLUME II

ROB DEKKERS



**MOMENTUM PRESS
ENGINEERING**

MOMENTUM PRESS, LLC, NEW YORK

ABSTRACT

This textbook, consisting of two volumes, brings innovation management closer to the practices of new product development. To this purpose, it presents concepts of innovation management, and processes, methods and tools for product development, particularly aiming at engineers and engineering students; it is also relevant to those in other studies, such as business and management to better understand the actual conversion from ideas and inventions into commercialization.

Volume II extends the basic concepts for innovation management and new product development of the first volume. Its first chapter pays attention to the role of intellectual property, particularly patents. Also, the role of non-practicing entities, who have attracted attention through court cases, but are said to be having an enormous impact on technological development, is discussed. The second chapter in this volume concerns national innovation systems, highlighting how government, industry, and universities work together. The third chapter presents some contemporary approaches to innovation management and product development: lean product development, open innovation, living labs, crowdsourcing, and sustainability. The fourth chapter offers a holistic view about how innovation management can be embedded in companies; this builds on the concepts of the previous chapters in both volumes of this book. The second volume concludes with an epilogue highlighting the importance of systems thinking for innovation management.

KEYWORDS

business models, collaboration, innovation management, intellectual property rights, new product development, new service development, open innovation, product life cycle, reference model, strategy, systems thinking, technology management

CONTENTS

LIST OF FIGURES	xiii
LIST OF TABLES	xv
LIST OF BOXES	xvii
PREFACE	xix

VOLUME I

1 WHY INNOVATION MANAGEMENT AND WHY IS IT IMPORTANT FOR ENGINEERS?	1
1.1 What Are Innovations?	3
1.2 Innovation Funnel	10
1.3 Business Models	16
1.4 Why Is Innovation Management Important for Engineers?	22
1.5 Outline of the Book	23
1.6 How to Use This Book	25
1.7 Key Points	26
1.8 References	27
2 BASIC PROCESSES FOR INNOVATION, PRODUCT, AND SERVICE DEVELOPMENT	31
2.1 Engineering as a Discipline	32
2.2 Reference Model for New Product and Service Development	35
2.3 Tools and Methods for Product Design and Engineering	48
2.4 Product Design and Engineering as a Decision-Making Process	54
2.5 New Service Development	63

2.6	Product and Service Architecture	66
2.7	Key Points	72
2.8	References	74
3	PRODUCT AND SERVICE LIFECYCLE MANAGEMENT	77
3.1	Product and Service Life-Cycles	78
3.2	Typical Sources of Innovation During Life Cycles	96
3.3	Technology Cycles	99
3.4	Generations of Innovation Processes	108
3.5	Strategic Tools for Innovation Management	110
3.6	Key Points	113
3.7	References	115
4	SOURCING FOR INNOVATION	119
4.1	Inventors	120
4.2	Customers and Users	123
4.3	Suppliers and Commercial Research Organizations	131
4.4	Universities	134
4.5	Employees	139
4.6	Competitors	141
4.7	Key Points	142
4.8	References	143
5	COLLABORATION FOR INNOVATION	147
5.1	Strategic Networks for Innovation	148
5.2	Collaborating with Suppliers	155
5.3	Loosely-Connected Innovation Networks	161
5.4	Actors in Processes of Innovation Networks	164
5.5	Absorptive Capacity	166
5.6	Global Research Networks	168
5.7	Supply Chain Management	169
5.8	Key Points	170
5.9	References	172
6	PROJECT MANAGEMENT (FOR INNOVATION)	177
6.1	Modes of Operation	178
6.2	Stage-Gate Models	186
6.3	Work Breakdown Structure	189
6.4	Planning and Scheduling of Projects	191

6.5	Management of Uncertainties and Risks in Projects	203
6.6	Organization of Project Teams	204
6.7	Information and Communication Plans	208
6.8	Managing Projects	210
6.9	Key Points	212
6.10	References	216
INDEX		217

VOLUME II

7	INTELLECTUAL PROPERTY	223
7.1	Forms of Intellectual Property for Innovation	225
7.2	Patenting Strategies	233
7.3	Commercialization of Patents	237
7.4	Non-Practicing Entities	244
7.5	Key Points	250
7.6	References	251
8	NATIONAL SYSTEMS OF INNOVATION	255
8.1	Defining National Innovation Systems	256
8.2	University–Industry Links	261
8.3	Regional Networks	268
8.4	Anglo–Saxon and Nippon–Rhineland Model	271
8.5	Key Points	274
8.6	References	275
9	CONTEMPORARY APPROACHES FOR INNOVATION AND TECHNOLOGY MANAGEMENT	279
9.1	Lean Product Development	280
9.2	Open Innovation	293
9.3	Living Labs and Other Smart Concepts	297
9.4	Crowdsourcing	304
9.5	Sustainability and Innovation	305
9.6	Key Points	307
9.7	References	308
10	PUTTING IT ALL TOGETHER	315
10.1	Innovation Management as a Dynamic Capability	316

10.2	Interrelationships Between Product Configurations and Process Structure	337
10.3	Integral View on Product and Service Development	339
10.4	Implications of Innovation Funnel	341
10.5	Key Points	342
10.6	References	342
EPILOGUE: SYSTEMS THINKING IN INNOVATION, INNOVATION IN SYSTEMS THINKING		349
INDEX		355