

Brief Contents

Preface vi

1 Introduction 1

PART ONE

Industry Dynamics of Technological Innovation 13

2 Sources of Innovation 15

3 Types and Patterns of Innovation 43

4 Standards Battles and Design Dominance 67

5 Timing of Entry 89

PART TWO

Formulating Technological Innovation Strategy 107

6 Defining the Organization's Strategic Direction 109

7 Choosing Innovation Projects 129

8 Collaboration Strategies 153

9 Protecting Innovation 183

PART THREE

Implementing Technological Innovation Strategy 209

10 Organizing for Innovation 211

11 Managing the New Product Development Process 235

12 Managing New Product Development Teams 265

13 Crafting a Deployment Strategy 283

INDEX 311

Contents

Chapter 1

Introduction 1

The Importance of Technological Innovation 1

The Impact of Technological Innovation on Society 2

Innovation by Industry: The Importance of Strategy 4

The Innovation Funnel 4

The Strategic Management of Technological Innovation 6

Summary of Chapter 9

Discussion Questions 10

Suggested Further Reading 10

Endnotes 10

PART ONE

INDUSTRY DYNAMICS OF TECHNOLOGICAL INNOVATION 13

Chapter 2

Sources of Innovation 15

Getting an Inside Look: Given Imaging's Camera Pill 15

Overview 19

Creativity 20

Individual Creativity 20

Organizational Creativity 20

Translating Creativity Into Innovation 22

The Inventor 22

Innovation by Users 24

Research and Development by Firms 26

Firm Linkages with Customers, Suppliers, Competitors, and Complementors 27

Universities and Government-Funded Research 28

Private Nonprofit Organizations 32

Innovation in Collaborative Networks 32

Technology Clusters 34

Technological Spillovers 37

Summary of Chapter 37

Discussion Questions 38

Suggested Further Reading 39

Endnotes 39

Chapter 3

Types and Patterns of Innovation 43

Tesla Motors 43

History of Tesla 43

The Roadster 44

The Model S 45

The Future of Tesla 46

Overview 47

Types of Innovation 48

Product Innovation versus Process Innovation 48

Radical Innovation versus Incremental Innovation 48

Competence-Enhancing Innovation versus Competence-Destroying Innovation 49

Architectural Innovation versus Component Innovation 50

Using the Dimensions 51

Technology S-Curves 51

S-Curves in Technological Improvement 52

S-Curves in Technology Diffusion 54

S-Curves as a Prescriptive Tool 56

Limitations of S-Curve Model as a Prescriptive Tool 57

Technology Cycles 57

Summary of Chapter 63

Discussion Questions	64
Suggested Further Reading	64
Endnotes	65

Chapter 4

Standards Battles and Design Dominance 67

A Battle Emerging in Mobile Payments	67
Overview	70
Why Dominant Designs are Selected	71
<i>Learning Effects</i>	71
<i>Network Externalities</i>	73
<i>Government Regulation</i>	75
<i>The Result: Winner-Take-All Markets</i>	76
Multiple Dimensions of Value	77
<i>A Technology's Stand-Alone Value</i>	77
<i>Network Externality Value</i>	77
<i>Competing for Design Dominance in Markets with Network Externalities</i>	82
<i>Are Winner-Take-All Markets Good for Consumers?</i>	84
Summary of Chapter	86
Discussion Questions	86
Suggested Further Reading	87
Endnotes	87

Chapter 5

Timing of Entry 89

From SixDegrees.com to Facebook: The Rise of Social Networking Sites	89
Overview	93
First-Mover Advantages	93
<i>Brand Loyalty and Technological Leadership</i>	93
<i>Preemption of Scarce Assets</i>	94
<i>Exploiting Buyer Switching Costs</i>	94
<i>Reaping Increasing Returns Advantages</i>	95
First-Mover Disadvantages	95
<i>Research and Development Expenses</i>	96
<i>Undeveloped Supply and Distribution Channels</i>	96
<i>Immature Enabling Technologies and Complements</i>	96
<i>Uncertainty of Customer Requirements</i>	97

Factors Influencing Optimal Timing of Entry	99
Strategies to Improve Timing Options	103
Summary of Chapter	103
Discussion Questions	104
Suggested Further Reading	104
Endnotes	105

PART TWO

FORMULATING TECHNOLOGICAL INNOVATION STRATEGY 107

Chapter 6

Defining the Organization's Strategic Direction 109

Reinventing Hotels: citizenM	109
Overview	111
Assessing The Firm's Current Position	111
<i>External Analysis</i>	111
<i>Internal Analysis</i>	115
Identifying Core Competencies and Dynamic Capabilities	119
<i>Core Competencies</i>	119
<i>The Risk of Core Rigidities</i>	120
<i>Dynamic Capabilities</i>	121
Strategic Intent	121
Summary of Chapter	126
Discussion Questions	126
Suggested Further Reading	127
Endnotes	127

Chapter 7

Choosing Innovation Projects 129

The Mahindra Shaan: Gambling on a Radical Innovation	129
Overview	131
The Development Budget	131
Quantitative Methods for Choosing Projects	133
<i>Discounted Cash Flow Methods</i>	133
<i>Real Options</i>	138
Disadvantages of Quantitative Methods	140
Qualitative Methods for Choosing Projects	140
<i>Screening Questions</i>	141
<i>The Aggregate Project Planning Framework</i>	143
<i>Q-Sort</i>	145

Combining Quantitative and Qualitative Information 145
Conjoint Analysis 145
Data Envelopment Analysis 147
 Summary of Chapter 149
 Discussion Questions 149
 Suggested Further Reading 150
 Endnotes 150

Chapter 8
Collaboration Strategies 153

Ending HIV? Sangamo Biosciences and Gene Editing 153
 Correcting Monogenic Diseases 153
 Drug Development and Clinical Trials 155
 Competing Technologies 156
 Sangamo's Partnerships 157
 A World-Changing Opportunity: Creating Immunity to HIV 158
 The Future . . . 159
 Overview 160
 Reasons for Going Solo 161
 1. *Availability of Capabilities* 161
 2. *Protecting Proprietary Technologies* 161
 3. *Controlling Technology Development and Use* 162
 4. *Building and Renewing Capabilities* 162
 Advantages of Collaborating 163
 Types of Collaborative Arrangements 164
 Strategic Alliances 165
 Joint Ventures 167
 Licensing 167
 Outsourcing 168
 Collective Research Organizations 170
 Choosing a Mode of Collaboration 170
 Choosing and Monitoring Partners 173
 Partner Selection 173
 Partner Monitoring and Governance 174
 Summary of Chapter 177
 Discussion Questions 178
 Suggested Further Reading 179
 Endnotes 179

Chapter 9
Protecting Innovation 183

The Digital Music Distribution Revolution 183
 Fraunhofer and MP3 183
 Napster Takes the Lead 184
 iTunes Just in Time 185
 Overview 187
 Appropriability 188
 Patents, trademarks, and copyrights 188
 Patents 189
 Trademarks and Service Marks 194
 Copyright 195
 Trade Secrets 196
 The Effectiveness and Use of Protection Mechanisms 197
 Wholly Proprietary Systems versus Wholly Open Systems 198
 Advantages of Protection 200
 Advantages of Diffusion 201
 Summary of Chapter 204
 Discussion Questions 205
 Suggested Further Reading 205
 Endnotes 206

PART THREE
IMPLEMENTING TECHNOLOGICAL INNOVATION STRATEGY 209

Chapter 10
Organizing for Innovation 211

Organizing for Innovation at Google 211
 Overview 213
 Size and Structural Dimensions of the Firm 214
 Size: Is Bigger Better? 214
 Structural Dimensions of the Firm 216
 Centralization 216
 Formalization and Standardization 217
 Mechanistic versus Organic Structures 218
 Size versus Structure 218

<i>The Ambidextrous Organization: The Best of Both Worlds?</i>	220
Modularity and “Loosely Coupled” Organizations	222
<i>Modular Products</i>	222
<i>Loosely Coupled Organizational Structures</i>	223
Managing Innovation Across Borders	226
Summary of Chapter	229
Discussion Questions	230
Suggested Further Reading	230
Endnotes	231

Chapter 11

Managing the New Product Development Process 235

Skullcandy: Developing Extreme Headphones	235
The Idea	235
Building an Action Sports Brand	236
Developing the Ultimate DJ Headphone	236
Overview	240
Objectives of the New Product Development Process	241
<i>Maximizing Fit with Customer Requirements</i>	241
<i>Minimizing Development Cycle Time</i>	242
<i>Controlling Development Costs</i>	242
Sequential Versus Partly Parallel Development Processes	243
Project Champions	245
<i>Risks of Championing</i>	245
Involving Customers and Suppliers in the Development Process	247
<i>Involving Customers</i>	247
<i>Involving Suppliers</i>	248
<i>Crowdsourcing</i>	248
Tools for Improving the New Product Development Process	249
<i>Stage-Gate Processes</i>	250
<i>Quality Function Deployment (QFD)—The House of Quality</i>	252
<i>Design for Manufacturing</i>	254
<i>Failure Modes and Effects Analysis</i>	255

<i>Computer-Aided Design Computer-Aided Engineering/Computer-Aided Manufacturing</i>	256
Tools for Measuring New Product Development Performance	257
<i>New Product Development Process Metrics</i>	259
<i>Overall Innovation Performance</i>	259
Summary of Chapter	259
Discussion Questions	260
Suggested Further Reading	260
Endnotes	261

Chapter 12

Managing New Product Development Teams 265

Innovation Teams at the Walt Disney Company	265
The Making of an Animated Film	265
Workspace and Collocation	266
Team Communication	266
Creating a Creative Culture	266
Overview	267
Constructing New Product Development Teams	267
<i>Team Size</i>	268
<i>Team Composition</i>	268
The Structure of New Product Development Teams	271
<i>Functional Teams</i>	271
<i>Lightweight Teams</i>	272
<i>Heavyweight Teams</i>	272
<i>Autonomous Teams</i>	272
The Management of New Product Development Teams	274
<i>Team Leadership</i>	274
<i>Team Administration</i>	274
<i>Managing Virtual Teams</i>	275
Summary of Chapter	278
Discussion Questions	278
Suggested Further Reading	279
Endnotes	279

Chapter 13
Crafting a Deployment Strategy 283

Deployment Tactics in the Global Video Game Industry 283

Pong: The Beginning of an Era 283

The Emergence of 8-Bit Systems 284

The 16-Bit Video Game Systems 284

32/64-Bit Systems 285

128-Bit Systems 286

The Seventh Generation: A Second Round of Competition in 128-bit Systems 288

The Eighth Generation: Increasing Competition from Mobile Devices 289

Overview 291

Launch Timing 292

Strategic Launch Timing 292

Optimizing Cash Flow versus Embracing

Cannibalization 293

Licensing and Compatibility 294

Pricing 295

Distribution 297

Selling Direct versus Using

Intermediaries 297

Strategies for Accelerating Distribution 299

Marketing 301

Major Marketing Methods 301

Tailoring the Marketing Plan to Intended

Adopters 303

Using Marketing to Shape Perceptions and

Expectations 305

Summary of Chapter 308

Discussion Questions 309

Suggested Further Reading 309

Endnotes 310

Index 311