

PROJECT MANAGEMENT

THE MANAGERIAL PROCESS 8E



**Mc
Graw
Hill**

ERIK W. LARSON
CLIFFORD F. GRAY

Brief Contents

Preface ix

- 1.** Modern Project Management 2
- 2.** Organization Strategy and Project Selection 28
- 3.** Organization: Structure and Culture 68
- 4.** Defining the Project 104
- 5.** Estimating Project Times and Costs 134
- 6.** Developing a Project Schedule 168
- 7.** Managing Risk 212
- 8.** Scheduling Resources and Costs 258
- 9.** Reducing Project Duration 318
- 10.** Being an Effective Project Manager 354
- 11.** Managing Project Teams 390
- 12.** Outsourcing: Managing Interorganizational Relations 434
- 13.** Progress and Performance Measurement and Evaluation
474
- 14.** Project Closure 532
- 15.** Agile Project Management 562

16. International Projects 590

APPENDIX

One Solutions to Selected Exercises 626

Two Computer Project Exercises 639

GLOSSARY 656

ACRONYMS 663

PROJECT MANAGEMENT EQUATIONS 664

**CROSS REFERENCE OF PROJECT MANAGEMENT
665**

**SOCIO-TECHNICAL APPROACH TO PROJECT
MANAGEMENT 666**

INDEX 667



501-1333

Contents

Preface ix

Chapter 1

Modern Project Management 2

- 1.1 What Is a Project? 6
 - What a Project Is Not 7*
 - Program versus Project 7*
 - The Project Life Cycle 9*
 - The Project Manager 10*
 - Being Part of a Project Team 11*
- 1.2 Agile Project Management 12
- 1.3 Current Drivers of Project Management 15
 - Compression of the Product Life Cycle 15*
 - Knowledge Explosion 15*
 - Triple Bottom Line (Planet, People, Profit) 15*
 - Increased Customer Focus 15*
 - Small Projects Represent Big Problems 16*
- 1.4 Project Management Today: A Socio-Technical Approach 17
- Summary 18

Chapter 2

Organization Strategy and Project Selection 28

- 2.1 Why Project Managers Need to Understand Strategy 30
- 2.2 The Strategic Management Process: An Overview 31

	<i>Four Activities of the Strategic Management Process</i>	31
2.3	The Need for a Project Priority System	36
	<i>Problem 1: The Implementation Gap</i>	36
	<i>Problem 2: Organization Politics</i>	37
	<i>Problem 3: Resource Conflicts and Multitasking</i>	38
2.4	Project Classification	38
2.5	Phase Gate Model	39
2.6	Selection Criteria	41
	<i>Financial Criteria</i>	41
	<i>Nonfinancial Criteria</i>	43
	<i>Two Multi-Criteria Selection Models</i>	43
2.7	Applying a Selection Model	46
	<i>Project Classification</i>	46
	<i>Sources and Solicitation of Project Proposals</i>	47
	<i>Ranking Proposals and Selection of Projects</i>	49
2.8	Managing the Portfolio System	52
	<i>Senior Management Input</i>	52
	<i>Governance Team Responsibilities</i>	52
	<i>Balancing the Portfolio for Risks and Types of Projects</i>	52
	Summary	54
	Chapter 3	
	Organization: Structure and Culture	68
3.1	Project Management Structures	70
	<i>Organizing Projects within the Functional Organization</i>	70
	<i>Organizing Projects as Dedicated Teams</i>	73
	<i>Organizing Projects within a Matrix Arrangement</i>	77
	<i>Different Matrix Forms</i>	78
3.2	Project Management Office (PMO)	81
3.3	What Is the Right Project Management Structure?	83
	<i>Organization Considerations</i>	83

	<i>Project Considerations</i>	83
3.4	Organizational Culture	84
	<i>What Is Organizational Culture?</i>	85
	<i>Identifying Cultural Characteristics</i>	87
3.5	Implications of Organizational Culture for Organizing Projects	89
	Summary	92

Chapter 4

Defining the Project 104

4.1	Step 1: Defining the Project Scope	106
	<i>Employing a Project Scope Checklist</i>	107
4.2	Step 2: Establishing Project Priorities	111
4.3	Step 3: Creating the Work Breakdown Structure	113
	<i>Major Groupings in a WBS</i>	113
	<i>How a WBS Helps the Project Manager</i>	113
	<i>A Simple WBS Development</i>	114
4.4	Step 4: Integrating the WBS with the Organization	118
4.5	Step 5: Coding the WBS for the Information System	118
4.6	Process Breakdown Structure	121
4.7	Responsibility Matrices	122
4.8	Project Communication Plan	124
	Summary	126

Chapter 5

Estimating Project Times and Costs 134

5.1	Factors Influencing the Quality of Estimates	136
	<i>Planning Horizon</i>	136
	<i>Project Complexity</i>	136

	<i>People</i>	136
	<i>Project Structure and Organization</i>	137
	<i>Padding Estimates</i>	137
	<i>Organizational Culture</i>	137
	<i>Other Factors</i>	137
5.2	Estimating Guidelines for Times, Costs, and Resources	138
5.3	Top-Down versus Bottom-Up Estimating	139
5.4	Methods for Estimating Project Times and Costs	142
	<i>Top-Down Approaches for Estimating Project Times and Costs</i>	142
	<i>Bottom-Up Approaches for Estimating Project Times and Costs</i>	146
	<i>A Hybrid: Phase Estimating</i>	147
5.5	Level of Detail	149
5.6	Types of Costs	150
	<i>Direct Costs</i>	151
	<i>Direct Project Overhead Costs</i>	151
	<i>General and Administrative (G&A) Overhead Costs</i>	151
5.7	Refining Estimates	152
5.8	Creating a Database for Estimating	154
5.9	Mega Projects: A Special Case	155
	Summary	158
	Appendix 5.1: Learning Curves for Estimating	164

Chapter 6

Developing a Project Schedule 168

6.1	Developing the Project Network	169
6.2	From Work Package to Network	170
6.3	Constructing a Project Network	172
	<i>Terminology</i>	172
	<i>Basic Rules to Follow in Developing Project Networks</i>	172
6.4	Activity-on-Node (AON) Fundamentals	173

6.5	Network Computation Process	176
	<i>Forward Pass—Earliest Times</i>	177
	<i>Backward Pass—Latest Times</i>	179
	<i>Determining Slack (or Float)</i>	180
6.6	Using the Forward and Backward Pass Information	183
6.7	Level of Detail for Activities	184
6.8	Practical Considerations	184
	<i>Network Logic Errors</i>	184
	<i>Activity Numbering</i>	184
	<i>Use of Computers to Develop Networks</i>	185
	<i>Calendar Dates</i>	185
	<i>Multiple Starts and Multiple Projects</i>	185
6.9	Extended Network Techniques to Come Closer to Reality	188
	<i>Laddering</i>	188
	<i>Use of Lags to Reduce Schedule Detail and Project Duration</i>	188
	<i>An Example Using Lag Relationships—the Forward and Backward Pass</i>	192
	<i>Hammock Activities</i>	193
	Summary	194

Chapter 7

Managing Risk 212

7.1	Risk Management Process	214
7.2	Step 1: Risk Identification	216
7.3	Step 2: Risk Assessment	219
	<i>Probability Analysis</i>	222
7.4	Step 3: Risk Response Development	223
	<i>Mitigating Risk</i>	223
	<i>Avoiding Risk</i>	225
	<i>Transferring Risk</i>	225
	<i>Escalating Risk</i>	225
	<i>Retaining Risk</i>	225

7.5	Contingency Planning	226
	<i>Technical Risks</i>	227
	<i>Schedule Risks</i>	229
	<i>Cost Risks</i>	229
	<i>Funding Risks</i>	229
7.6	Opportunity Management	230
7.7	Contingency Funding and Time Buffers	231
	<i>Contingency Reserves</i>	231
	<i>Management Reserves</i>	232
	<i>Time Buffers</i>	232
7.8	Step 4: Risk Response Control	233
7.9	Change Control Management	234
	Summary	237
	Appendix 7.1: PERT and PERT Simulation	248

Chapter 8

Scheduling Resources and Costs 258

8.1	Overview of the Resource Scheduling Problem	260
8.2	Types of Resource Constraints	262
8.3	Classification of a Scheduling Problem	263
8.4	Resource Allocation Methods	263
	<i>Assumptions</i>	263
	<i>Time-Constrained Projects: Smoothing Resource Demand</i>	264
	<i>Resource-Constrained Projects</i>	265
8.5	Computer Demonstration of Resource-Constrained Scheduling	270
	<i>The Impacts of Resource-Constrained Scheduling</i>	274
8.6	Splitting Activities	277
8.7	Benefits of Scheduling Resources	278

8.8	Assigning Project Work	279
8.9	Multiproject Resource Schedules	280
8.10	Using the Resource Schedule to Develop a Project Cost Baseline	281
	<i>Why a Time-Phased Budget Baseline Is Needed</i>	281
	<i>Creating a Time-Phased Budget</i>	282
	Summary	287
	Appendix 8.1: The Critical-Chain Approach	308

Chapter 9

Reducing Project Duration 318

9.1	Rationale for Reducing Project Duration	320
9.2	Options for Accelerating Project Completion	321
	<i>Options When Resources Are Not Constrained</i>	322
	<i>Options When Resources Are Constrained</i>	324
9.3	Project Cost-Duration Graph	327
	<i>Explanation of Project Costs</i>	327
9.4	Constructing a Project Cost-Duration Graph	328
	<i>Determining the Activities to Shorten</i>	328
	<i>A Simplified Example</i>	330
9.5	Practical Considerations	332
	<i>Using the Project Cost-Duration Graph</i>	332
	<i>Crash Times</i>	333
	<i>Linearity Assumption</i>	333
	<i>Choice of Activities to Crash Revisited</i>	333
	<i>Time Reduction Decisions and Sensitivity</i>	334
9.6	What If Cost, Not Time, Is the Issue?	335
	<i>Reduce Project Scope</i>	336
	<i>Have Owner Take on More Responsibility</i>	336
	<i>Outsource Project Activities or Even the Entire Project</i>	336
	<i>Brainstorm Cost Savings Options</i>	336

Summary 337

Chapter 10

Being an Effective Project Manager 354

10.1 Managing versus Leading a Project 356

10.2 Engaging Project Stakeholders 357

10.3 Influence as Exchange 361

Task-Related Currencies 362

Position-Related Currencies 363

Inspiration-Related Currencies 363

Relationship-Related Currencies 363

Personal-Related Currencies 364

10.4 Social Network Building 364

Mapping Stakeholder Dependencies 364

Management by Wandering Around (MBWA) 366

Managing Upward Relations 367

Leading by Example 369

10.5 Ethics and Project Management 372

10.6 Building Trust: The Key to Exercising Influence 373

10.7 Qualities of an Effective Project Manager 375

Summary 378

Chapter 11

Managing Project Teams 390

11.1 The Five-Stage Team Development Model 393

11.2 Situational Factors Affecting Team Development 395

11.3 Building High-Performance Project Teams 397

Recruiting Project Members 397

Conducting Project Meetings 399

Establishing Team Norms 401

Establishing a Team Identity 403

	<i>Creating a Shared Vision</i>	404
	<i>Managing Project Reward Systems</i>	406
	<i>Orchestrating the Decision-Making Process</i>	408
	<i>Managing Conflict within the Project</i>	410
	<i>Rejuvenating the Project Team</i>	413
11.4	Managing Virtual Project Teams	415
11.5	Project Team Pitfalls	419
	<i>Groupthink</i>	419
	<i>Bureaucratic Bypass Syndrome</i>	419
	<i>Team Spirit Becomes Team Infatuation</i>	419
	Summary	421
	Chapter 12	
	Outsourcing: Managing Interorganizational Relations	434
12.1	Outsourcing Project Work	436
12.2	Request for Proposal (RFP)	440
	<i>Selection of Contractor from Bid Proposals</i>	441
12.3	Best Practices in Outsourcing Project Work	442
	<i>Well-Defined Requirements and Procedures</i>	442
	<i>Extensive Training and Team-Building Activities</i>	444
	<i>Well-Established Conflict Management Processes in Place</i>	445
	<i>Frequent Review and Status Updates</i>	447
	<i>Co-location When Needed</i>	448
	<i>Fair and Incentive-Laden Contracts</i>	449
	<i>Long-Term Outsourcing Relationships</i>	449
12.4	The Art of Negotiating	450
	<i>1. Separate the People from the Problem</i>	451
	<i>2. Focus on Interests, Not Positions</i>	452
	<i>3. Invent Options for Mutual Gain</i>	453
	<i>4. When Possible, Use Objective Criteria</i>	454

	<i>Dealing with Unreasonable People</i>	454
12.5	A Note on Managing Customer Relations	455
	Summary	458
	Appendix 12.1: Contract Management	467
Chapter 13		
	Progress and Performance Measurement and Evaluation	474
13.1	Structure of a Project Monitoring Information System	476
	<i>What Data Are Collected?</i>	476
	<i>Collecting Data and Analysis</i>	476
	<i>Reports and Reporting</i>	476
13.2	The Project Control Process	477
	<i>Step 1: Setting a Baseline Plan</i>	477
	<i>Step 2: Measuring Progress and Performance</i>	477
	<i>Step 3: Comparing Plan against Actual</i>	477
	<i>Step 4: Taking Action</i>	478
13.3	Monitoring Time Performance	478
	<i>Tracking Gantt Chart</i>	478
	<i>Control Chart</i>	479
	<i>Milestone Schedules</i>	479
13.4	Earned Value Management (EVM)	480
	<i>The Need for Earned Value Management</i>	480
	<i>Percent Complete Rule</i>	484
	<i>What Costs Are Included in Baselines?</i>	484
	<i>Methods of Variance Analysis</i>	485
13.5	Developing a Status Report: A Hypothetical Example	487
	<i>Assumptions</i>	487
	<i>Baseline Development</i>	487
	<i>Development of the Status Report</i>	488
13.6	Indexes to Monitor Progress	492
	<i>Performance Indexes</i>	493

	<i>Project Percent Complete Indexes</i>	494
	<i>Software for Project Cost/Schedule Systems</i>	494
	<i>Additional Earned Value Rules</i>	495
13.7	Forecasting Final Project Cost	496
13.8	Other Control Issues	498
	<i>Technical Performance Measurement</i>	498
	<i>Scope Creep</i>	500
	<i>Baseline Changes</i>	500
	<i>The Costs and Problems of Data Acquisition</i>	502
	Summary	503
	Appendix 13.1: The Application of Additional Earned Value Rules	522
	Appendix 13.2: Obtaining Project Performance Information from MS Project 2010 or 2016	528

Chapter 14

Project Closure 532

14.1	Types of Project Closure	534
14.2	Wrap-up Closure Activities	536
14.3	Project Audits	539
	<i>The Project Audit Process</i>	540
	<i>Project Retrospectives</i>	543
14.4	Project Audits: The Big Picture	543
	<i>Level 1: Ad Hoc Project Management</i>	546
	<i>Level 2: Formal Application of Project Management</i>	546
	<i>Level 3: Institutionalization of Project Management</i>	547
	<i>Level 4: Management of Project Management System</i>	547
	<i>Level 5: Optimization of Project Management System</i>	548
14.5	Post-implementation Evaluation	548
	<i>Team Evaluation</i>	548
	<i>Individual, Team Member, and Project Manager Performance Reviews</i>	550

Summary 552

Appendix 14.1: Project Closeout Checklist 555

Chapter 15

Agile Project Management 562

15.1 Traditional versus Agile Methods 564

15.2 Agile PM 566

15.3 Agile PM in Action: Scrum 569

Roles and Responsibilities 570

Scrum Meetings 572

Product and Sprint Backlogs 573

Sprint and Release Burndown Charts 575

page xxii

15.4 Extreme Programming and Kanban 576

Kanban 577

15.5 Applying Agile PM to Large Projects 578

15.6 Limitations and Concerns 580

15.7 Hybrid Models 580

Summary 581

Chapter 16

International Projects 590

16.1 Environmental Factors 592

Legal/Political Factors 593

Security 593

Geography 594

Economic Factors 594

Infrastructure 596

Culture 597

16.2 Project Site Selection 599

16.3 Cross-Cultural Considerations: A Closer Look 600

<i>Adjustments</i>	601
<i>Working in Mexico</i>	602
<i>Working in France</i>	605
<i>Working in Saudi Arabia</i>	606
<i>Working in China</i>	608
<i>Working in the United States</i>	609
<i>Summary Comments about Working in Different Cultures</i>	611
<i>Culture Shock</i>	611

16.4 Selection and Training for International Projects 614

Summary 617

Appendix One: Solutions to Selected Exercises 626

Appendix Two: Computer Project Exercises 639

Glossary 656

Acronyms 663

Project Management Equations 664

Cross Reference of Project Management 665

Socio-Technical Approach to Project Management 666

Index 667