

Project Management:

The Managerial Process

Seventh Edition

Erik W. Larson

Clifford F. Gray

Oregon State University

Brief Contents

Preface ix

- 1.** Modern Project Management 2
- 2.** Organization Strategy and Project Selection 26
- 3.** Organization: Structure and Culture 66
- 4.** Defining the Project 100
- 5.** Estimating Project Times and Costs 128
- 6.** Developing a Project Plan 162
- 7.** Managing Risk 206
- 8.** Scheduling Resources and Costs 250
- 9.** Reducing Project Duration 304
- 10.** Being an Effective Project Manager 338
- 11.** Managing Project Teams 374
- 12.** Outsourcing: Managing Interorganizational Relations 418
- 13.** Progress and Performance Measurement and Evaluation 458
- 14.** Project Closure 514
- 15.** International Projects 544
- 16.** An Introduction to Agile Project Management 578

APPENDIX

One Solutions to Selected Exercises 603

Two Computer Project Exercises 616

GLOSSARY 633

ACRONYMS 640

PROJECT MANAGEMENT EQUATIONS 641

CROSS REFERENCE OF PROJECT MANAGEMENT 642

SOCIO-TECHNICAL APPROACH TO PROJECT MANAGEMENT 643

INDEX 644

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* 8
 - The Project Manager* 9
 - Being Part of a Project Team* 11
- 1.2 Current Drivers of Project Management 12
 - Compression of the Product Life Cycle* 12
 - Knowledge Explosion* 12
 - Triple Bottom Line (Planet, People, Profit)* 12
 - Increased Customer Focus* 12
 - Small Projects Represent Big Problems* 15
- 1.3 Project Governance 15
 - Alignment of Projects with Organizational Strategy* 16
- 1.4 Project Management Today: A Socio-Technical Approach 17
- Summary 18

Chapter 2

Organization Strategy and Project Selection 26

- 2.1 The Strategic Management Process: An Overview 29
 - Four Activities of the Strategic Management Process* 29
- 2.2 The Need for a Project Priority System 34
 - Problem 1: The Implementation Gap* 34
 - Problem 2: Organization Politics* 35
 - Problem 3: Resource Conflicts and Multitasking* 36
- 2.3 A Portfolio Management System 37
 - Classification of the Project* 37
- 2.4 Selection Criteria 38
 - Financial Criteria* 38
 - Nonfinancial Criteria* 40
- 2.5 Applying a Selection Model 43
 - Project Classification* 43
 - Sources and Solicitation of Project Proposals* 44
 - Ranking Proposals and Selection of Projects* 46

- 2.6 Managing the Portfolio System 48
 - Senior Management Input* 48
 - The Governance Team Responsibilities* 49
 - Balancing the Portfolio for Risks and Types of Projects* 50
- Summary 51

Chapter 3

Organization: Structure and Culture 66

- 3.1 Project Management Structures 68
 - Organizing Projects within the Functional Organization* 68
 - Organizing Projects as Dedicated Teams* 71
 - Organizing Projects within a Matrix Arrangement* 75
 - Different Matrix Forms* 76
- 3.2 What Is the Right Project Management Structure? 79
 - Organization Considerations* 79
 - Project Considerations* 79
- 3.3 Organizational Culture 81
 - What Is Organizational Culture?* 81
 - Identifying Cultural Characteristics* 83
- 3.4 Implications of Organizational Culture for Organizing Projects 86
- Summary 89

Chapter 4

Defining the Project 100

- 4.1 Step 1: Defining the Project Scope 102
 - Employing a Project Scope Checklist* 103
- 4.2 Step 2: Establishing Project Priorities 106
- 4.3 Step 3: Creating the Work Breakdown Structure 108
 - Major Groupings Found in a WBS* 108
 - How WBS Helps the Project Manager* 108
 - A Simple WBS Development* 109
- 4.4 Step 4: Integrating the WBS with the Organization 113
- 4.5 Step 5: Coding the WBS for the Information System 113
- 4.6 Process Breakdown Structure 116

- 4.7 Responsibility Matrices 117
- 4.8 Project Communication Plan 119
- Summary 121

Chapter 5

Estimating Project Times and Costs 128

- 5.1 Factors Influencing the Quality of Estimates 130
 - Planning Horizon* 130
 - Project Complexity* 130
 - People* 131
 - Project Structure and Organization* 131
 - Padding Estimates* 131
 - Organization Culture* 131
 - Other Factors* 131
- 5.2 Estimating Guidelines for Times, Costs, and Resources 132
- 5.3 Top-Down versus Bottom-Up Estimating 134
- 5.4 Methods for Estimating Project Times and Costs 136
 - Top-Down Approaches for Estimating Project Times and Costs* 136
 - Bottom-Up Approaches for Estimating Project Times and Costs* 140
 - A Hybrid: Phase Estimating* 141
- 5.5 Level of Detail 143
- 5.6 Types of Costs 144
 - Direct Costs* 145
 - Direct Project Overhead Costs* 145
 - General and Administrative (G&A) Overhead Costs* 145
- 5.7 Refining Estimates 146
- 5.8 Creating a Database for Estimating 148
- 5.9 Mega Projects: A Special Case 149
- Summary 151
- Appendix 5.1: Learning Curves for Estimating 157

Chapter 6

Developing a Project Plan 162

- 6.1 Developing the Project Network 163
- 6.2 From Work Package to Network 164
- 6.3 Constructing a Project Network 166
 - Terminology* 166
 - Basic Rules to Follow in Developing Project Networks* 166

- 6.4 Activity-on-Node (AON) Fundamentals 167
- 6.5 Network Computation Process 171
 - Forward Pass—Earliest Times* 171
 - Backward Pass—Latest Times* 173
 - Determining Slack (or Float)* 175
- 6.6 Using the Forward and Backward Pass Information 177
- 6.7 Level of Detail for Activities 178
- 6.8 Practical Considerations 178
 - Network Logic Errors* 178
 - Activity Numbering* 179
 - Use of Computers to Develop Networks* 179
 - Calendar Dates* 182
 - Multiple Starts and Multiple Projects* 182
- 6.9 Extended Network Techniques to Come Closer to Reality 182
 - Laddering* 182
 - Use of Lags to Reduce Schedule Detail and Project Duration* 183
 - An Example Using Lag Relationships—The Forward and Backward Pass* 186
 - Hammock Activities* 188
- Summary 189

Chapter 7

Managing Risk 206

- 7.1 Risk Management Process 208
- 7.2 Step 1: Risk Identification 210
- 7.3 Step 2: Risk Assessment 212
 - Probability Analysis* 215
- 7.4 Step 3: Risk Response Development 216
 - Mitigating Risk* 216
 - Avoiding Risk* 217
 - Transferring Risk* 217
 - Accept Risk* 218
- 7.5 Contingency Planning 219
 - Technical Risks* 220
 - Schedule Risks* 222
 - Cost Risks* 222
 - Funding Risks* 222
- 7.6 Opportunity Management 223
- 7.7 Contingency Funding and Time Buffers 223
 - Budget Reserves* 224
 - Management Reserves* 224
 - Time Buffers* 225
- 7.8 Step 4: Risk Response Control 225
- 7.9 Change Control Management 226
- Summary 230
- Appendix 7.1: PERT and PERT Simulation 240

Chapter 8**Scheduling Resources and Costs 250**

- 8.1 Overview of the Resource Scheduling Problem 252
- 8.2 Types of Resource Constraints 254
- 8.3 Classification of a Scheduling Problem 255
- 8.4 Resource Allocation Methods 255
 - Assumptions* 255
 - Time-Constrained Project: Smoothing Resource Demand* 256
 - Resource-Constrained Projects* 257
- 8.5 Computer Demonstration of Resource-Constrained Scheduling 262
 - The Impacts of Resource-Constrained Scheduling* 266
- 8.6 Splitting Activities 269
- 8.7 Benefits of Scheduling Resources 270
- 8.8 Assigning Project Work 271
- 8.9 Multiproject Resource Schedules 272
- 8.10 Using the Resource Schedule to Develop a Project Cost Baseline 273
 - Why a Time-Phased Budget Baseline Is Needed* 273
 - Creating a Time-Phased Budget* 274
- Summary 279
- Appendix 8.1: The Critical-Chain Approach 294

Chapter 9**Reducing Project Duration 304**

- 9.1 Rationale for Reducing Project Duration 306
- 9.2 Options for Accelerating Project Completion 307
 - Options When Resources Are Not Constrained* 308
 - Options When Resources Are Constrained* 310
- 9.3 Project Cost–Duration Graph 313
 - Explanation of Project Costs* 313
- 9.4 Constructing a Project Cost–Duration Graph 314
 - Determining the Activities to Shorten* 314
 - A Simplified Example* 316
- 9.5 Practical Considerations 318
 - Using the Project Cost–Duration Graph* 318
 - Crash Times* 319
 - Linearity Assumption* 319
 - Choice of Activities to Crash Revisited* 319
 - Time Reduction Decisions and Sensitivity* 320

- 9.6 What If Cost, Not Time, Is the Issue? 321
 - Reduce Project Scope* 322
 - Have Owner Take on More Responsibility* 322
 - Outsourcing Project Activities or Even the Entire Project* 322
 - Brainstorming Cost Savings Options* 322
- Summary 323

Chapter 10**Being an Effective Project Manager 338**

- 10.1 Managing versus Leading a Project 340
- 10.2 Managing Project Stakeholders 341
- 10.3 Influence as Exchange 345
 - Task-Related Currencies* 345
 - Position-Related Currencies* 346
 - Inspiration-Related Currencies* 347
 - Relationship-Related Currencies* 347
 - Personal-Related Currencies* 348
- 10.4 Social Network Building 348
 - Mapping Stakeholder Dependencies* 348
 - Management by Wandering Around (MBWA)* 350
 - Managing Upward Relations* 351
 - Leading by Example* 353
- 10.5 Ethics and Project Management 356
- 10.6 Building Trust: The Key to Exercising Influence 357
- 10.7 Qualities of an Effective Project Manager 359
- Summary 362

Chapter 11**Managing Project Teams 374**

- 11.1 The Five-Stage Team Development Model 377
- 11.2 Situational Factors Affecting Team Development 379
- 11.3 Building High-Performance Project Teams 381
 - Recruiting Project Members* 381
 - Conducting Project Meetings* 383
 - Establishing Team Norms* 385
 - Establishing a Team Identity* 387
 - Creating a Shared Vision* 388
 - Managing Project Reward Systems* 391
 - Orchestrating the Decision-Making Process* 392
 - Managing Conflict within the Project* 394
 - Rejuvenating the Project Team* 398
- 11.4 Managing Virtual Project Teams 399
- 11.5 Project Team Pitfalls 403
 - Groupthink* 403
 - Bureaucratic Bypass Syndrome* 404

<i>Team Spirit Becomes Team Infatuation</i>	404
<i>Going Native</i>	404
Summary	405

Chapter 12

Outsourcing: Managing Interorganizational Relations 418

12.1 Outsourcing Project Work	420
12.2 Request for Proposal (RFP)	424
<i>Selection of Contractor from Bid Proposals</i>	425
12.3 Best Practices in Outsourcing Project Work	426
<i>Well-Defined Requirements and Procedures</i>	426
<i>Extensive Training and Team-Building Activities</i>	428
<i>Well-Established Conflict Management Processes in Place</i>	429
<i>Frequent Review and Status Updates</i>	431
<i>Co-Location When Needed</i>	432
<i>Fair and Incentive-Laden Contracts</i>	432
<i>Long-Term Outsourcing Relationships</i>	433
12.4 The Art of Negotiating	434
<i>1. Separate the People from the Problem</i>	435
<i>2. Focus on Interests, Not Positions</i>	436
<i>3. Invent Options for Mutual Gain</i>	437
<i>4. When Possible, Use Objective Criteria</i>	438
<i>Dealing with Unreasonable People</i>	438
12.5 A Note on Managing Customer Relations	439
Summary	442
Appendix 12.1: Contract Management	451

Chapter 13

Progress and Performance Measurement and Evaluation 458

13.1 Structure of a Project Monitoring Information System	460
<i>What Data Are Collected?</i>	460
<i>Collecting Data and Analysis</i>	460
<i>Reports and Reporting</i>	460
13.2 The Project Control Process	461
<i>Step 1: Setting a Baseline Plan</i>	461
<i>Step 2: Measuring Progress and Performance</i>	461
<i>Step 3: Comparing Plan against Actual</i>	462
<i>Step 4: Taking Action</i>	462
13.3 Monitoring Time Performance	462
<i>Tracking Gantt Chart</i>	463
<i>Control Chart</i>	463
<i>Milestone Schedules</i>	464
13.4 Development of an Earned Value Cost/Schedule System	467

<i>Percent Complete Rule</i>	467
<i>What Costs Are Included in Baselines?</i>	467
<i>Methods of Variance Analysis</i>	468

13.5 Developing a Status Report: A Hypothetical Example 470

<i>Assumptions</i>	470
<i>Baseline Development</i>	470
<i>Development of the Status Report</i>	471

13.6 Indexes to Monitor Progress 475

<i>Performance Indexes</i>	477
<i>Project Percent Complete Indexes</i>	474
<i>Software for Project Cost/Schedule Systems</i>	477
<i>Additional Earned Value Rules</i>	478

13.7 Forecasting Final Project Cost 476

13.8 Other Control Issues 481

<i>Technical Performance Measurement</i>	481
<i>Scope Creep</i>	483
<i>Baseline Changes</i>	483
<i>The Costs and Problems of Data Acquisition</i>	485

Summary 486

Appendix 13.1: The Application of Additional Earned Value Rules 505

Appendix 13.2: Obtaining Project Performance Information from MS Project 2010 or 2015 511

Chapter 14

Project Closure 514

14.1 Types of Project Closure	516
14.2 Wrap-up Closure Activities	518
14.3 Project Audits	521
<i>The Project Audit Process</i>	522
<i>Project Retrospectives</i>	525
<i>Project Audits: The Bigger Picture</i>	529
14.4 Post-Implementation Evaluation	532
<i>Team Evaluation</i>	532
<i>Individual, Team Member, and Project Manager Performance Reviews</i>	534

Summary 537

Appendix 14.1: Project Closeout Checklist 539

Appendix 14.2: Euro Conversion—Project Closure Checklist 541

Chapter 15

International Projects 544

15.1 Environmental Factors	546
<i>Legal/Political</i>	546
<i>Security</i>	547
<i>Geography</i>	548

Economic 549
Infrastructure 550
Culture 551

15.2 Project Site Selection 553

15.3 Cross-Cultural Considerations:
A Closer Look 554
Adjustments 555
Working in Mexico 556
Working in France 559
Working in Saudi Arabia 560
Working in China 562
Working in the United States 563
Summary Comments about Working in Different Cultures 565
Culture Shock 565
Coping with Culture Shock 567

15.4 Selection and Training for International Projects 568

Summary 571

Chapter 16
An Introduction to Agile Project Management 578

16.1 Traditional versus Agile Methods 580

16.2 Agile PM 582

16.3 Agile PM in Action: Scrum 585
Roles and Responsibilities 586
Scrum Meetings 587
Product and Sprint Backlogs 588
Sprint and Release Burndown Charts 589

16.4 Applying Agile PM to Large Projects 592

16.5 Limitations and Concerns 593

Summary 595

Appendix One: Solutions to Selected Exercise 603

Appendix Two: Computer Project Exercises 616

Glossary 633

Acronyms 640

Project Management Equations 641

Cross Reference of Project Management 642

Socio-Technical Approach to Project Management 643

Index 644