

Service Management

Operations, Strategy,
Information Technology

Ninth Edition

Sanjeev Bordoloi

*Associate Professor of Operations
Management
University of St. Thomas, Minnesota*

James A. Fitzsimmons

*Seay Professor of Business Emeritus
University of Texas at Austin*

Mona J. Fitzsimmons



Brief Contents

PART ONE

Understanding Services 1

- 1 The Service Economy 3
- 2 Service Strategy 27

PART TWO

Designing the Service Enterprise 61

- 3 New Service Development 63
- 4 The Service Encounter 95
- 5 Supporting Facility and Process Flows 119
- 6 Service Quality 149
- 7 Process Improvement 187
- Supplement:** Data Envelopment Analysis (DEA) 209
- 8 Service Facility Location 219

PART THREE

Managing Service Operations 247

- 9 Service Supply Relationships 249
- 10 Globalization of Services 279
- 11 Managing Capacity and Demand 301
- 12 Managing Waiting Lines 335
- 13 Capacity Planning and Queuing Models 357
- Supplement:** Computer Simulation 382

PART FOUR

Quantitative Models for Service Management 401

- 14 Forecasting Demand for Services 403
- 15 Managing Service Inventory 427
- 16 Managing Service Projects 461

APPENDIX

- A** Areas of Standard Normal Distribution 495
- B** Uniformly Distributed Random Numbers $[0, 1]$ 496
- C** Values of L_q for the $M/M/c$ Queuing Model 497
- D** Equations for Selected Queuing Models 499

NAME INDEX 505

SUBJECT INDEX 509

Table of Contents

PART ONE

UNDERSTANDING SERVICES 1

Chapter 1

The Service Economy 3

Learning Objectives	3
Chapter Preview	4
Service Definitions	4
Facilitating Role of Services in an Economy	4
Economic Evolution	5
Stages of Economic Development	6
<i>Preindustrial Society</i>	6
<i>Industrial Society</i>	7
<i>Postindustrial Society</i>	7
Nature of the Service Sector	8
The Experience Economy	9
<i>Consumer Service Experience</i>	10
<i>Business Service Experience</i>	10
Service-Dominant Logic	11
Distinctive Characteristics of Service Operations	13
<i>Customer Participation</i>	13
<i>Simultaneity</i>	14
<i>Perishability</i>	14
<i>Intangibility</i>	15
<i>Heterogeneity</i>	15
<i>Nontransferable Ownership</i>	16
The Service Package	17
Grouping Services by Delivery Process	18
Open-Systems View of Service Operations Management	20
Service Benchmark: Sharing Economy Pioneers Uber and Airbnb	22
Summary	22
Key Terms and Definitions	22
Topics for Discussion	23
Interactive Exercise	23
CASE 1.1: Village Volvo	23
CASE 1.2: Xpresso Lube	24
Selected Bibliography	26
Endnotes	26

Chapter 2

Service Strategy 27

Learning Objectives	27
Chapter Preview	27
The Strategic Service Vision	28
Understanding the Competitive Environment of Services	29

Competitive Service Strategies	30
<i>Overall Cost Leadership</i>	30
<i>Differentiation</i>	31
<i>Focus</i>	32
Strategic Analysis	33
<i>Porter's Five Forces Analysis</i>	33
<i>SWOT Analysis: Strengths, Weaknesses, Opportunities, Threats</i>	34
Winning Customers in the Marketplace	34
<i>Qualifiers</i>	35
<i>Service Winners</i>	35
<i>Service Losers</i>	36
Sustainability in Services	36
<i>Triple Bottom Line (TBL)</i>	36
The Competitive Role of Information in Services	38
<i>Creation of Barriers to Entry</i>	38
<i>Revenue Generation</i>	40
<i>Database Asset</i>	40
<i>Productivity Enhancement</i>	41
The Internet of Things (IoT)	42
Data Analytics in Services	44
The Virtual Value Chain	45
<i>First Stage (New Processes)</i>	46
<i>Second Stage (New Knowledge)</i>	47
<i>Third Stage (New Products)</i>	47
<i>Fourth Stage (New Relationships)</i>	47
Economics of Scalability	47
Limits in the Use of Information	48
<i>Anticompetitive</i>	48
<i>Fairness</i>	49
<i>Invasion of Privacy</i>	49
<i>Data Security</i>	49
<i>Reliability</i>	49
Using Information to Categorize Customers	49
Stages in Service Firm Competitiveness	50
<i>Available for Service</i>	50
<i>Journeyman</i>	50
<i>Distinctive Competence Achieved</i>	50
<i>World-Class Service Delivery</i>	52
Service Benchmark: Outside the Box	52
Summary	52
Key Terms and Definitions	53
Topics for Discussion	53
Interactive Exercise	54
CASE 2.1: United Commercial Bank and El Banco	54
CASE 2.2: The Alamo Drafthouse	56
Selected Bibliography	58
Endnotes	59

PART TWO**DESIGNING THE SERVICE ENTERPRISE 61****Chapter 3****New Service Development 63**

Learning Objectives 63

Chapter Preview 64

Sources of Service Sector Growth 64

Information Technology 64*The Internet as a Service Enabler* 65*Innovation* 66*Changing Demographics* 66

Innovation in Services 67

Challenges of Adopting New Technology in Services 70*Readiness to Embrace New Technology* 70

New Service Development 70

Service Design Elements 72

Strategic Positioning through Process

Structure 73

Service Blueprinting 74

Taxonomy for Service Process Design 76

Degree of Divergence 77*Object of the Service Process* 77*Type of Customer Contact* 77

Generic Approaches to Service System Design 78

Production-Line Approach 79*Customer as Coproducer* 80*Customer Contact Approach* 81*Information Empowerment* 83

Intellectual Property 84

Service Benchmark: Ten Things Google

Has Found To Be True 85

Summary 85

Key Terms and Definitions 86

Topics for Discussion 86

Interactive Exercise 86

CASE 3.1: 100 Yen Sushi House 86

CASE 3.2: Commuter Cleaning—A New Venture

Proposal 87

CASE 3.3: Amazon.com 89

Selected Bibliography 92

Endnotes 92

Chapter 4**The Service Encounter 95**

Learning Objectives 95

Chapter Preview 95

Technology in the Service Encounter 96

The Emergence of Self-Service 97

The Service Encounter Triad 98

Encounter Dominated by the Service Organization 99*Contact Personnel-Dominated Encounter* 99*Customer-Dominated Encounter* 99

The Service Organization 100

Culture 100*Empowerment* 101*Control Systems* 102*Customer Relationship Management* 102

Contact Personnel 103

Selection 103*Training* 104*Creating an Ethical Climate* 105

The Customer 106

Expectations and Attitudes 106*The Role of Scripts in Coproduction* 107

Creating a Customer Service Orientation 108

Service Profit Chain 109

Service Benchmark: Miss Manners on Complaint

Handling 111

Summary 111

Key Terms and Definitions 112

Topics for Discussion 112

Interactive Exercise 112

CASE 4.1: Amy's Ice Cream 112

CASE 4.2: Enterprise Rent-A-Car 113

Selected Bibliography 116

Endnotes 117

Chapter 5**Supporting Facility and Process Flows 119**

Learning Objectives 119

Chapter Preview 120

Environmental Psychology and Orientation 120

Servicescapes 120

Behaviors in Servicescapes 121*Environmental Dimensions of Servicescapes* 122

Facility Design 124

Nature and Objectives of Service Organizations 124*Land Availability and Space Requirements* 125*Flexibility* 125*Security* 125*Aesthetic Factors* 126*The Community and Environment* 126

Process Analysis 127

Types of Processes 127*Flowcharting* 127*Gantt Chart* 128*Process Terminology* 129

Facility Layout 131

Flow Process Layout and the Work Allocation Problem 131*Job Shop Process Layout and the Relative Location**Problem* 133

Summary 136

Service Benchmark: Where, Oh Where Shall We Go? 137

Key Terms and Definitions 137

Topics for Discussion 138

Interactive Exercise 138

Solved Problems	138
Exercises	140
CASE 5.1: Health Maintenance Organization (A)	143
CASE 5.2: Health Maintenance Organization (B)	144
CASE 5.3: Esquire Department Store	144
CASE 5.4: Central Market	145
Selected Bibliography	147
Endnotes	147

Chapter 6

Service Quality 149

Learning Objectives	149
Chapter Preview	149
Defining Service Quality	150
<i>Dimensions of Service Quality</i>	150
<i>Gaps in Service Quality</i>	151
Measuring Service Quality	153
<i>SERVQUAL</i>	153
<i>Walk-through Audit</i>	154
Quality Service by Design	158
<i>Incorporation of Quality in the Service Package</i>	158
<i>Taguchi Methods</i>	159
<i>Poka-Yoke (Failsafing)</i>	160
<i>Quality Function Deployment</i>	161
Achieving Service Quality	163
<i>Cost of Quality</i>	163
<i>Statistical Process Control</i>	164
<i>Unconditional Service Guarantee</i>	168
<i>Stages in Quality Development</i>	170
Service Recovery	170
<i>Approaches to Service Recovery</i>	172
<i>Complaint Handling Policy</i>	173
Service Benchmark: Bronson Methodist Hospital	173
Summary	174
Key Terms and Definitions	174
Topics for Discussion	174
Interactive Exercise	175
Solved Problems	175
Exercises	176
CASE 6.1: Clean Sweep, Inc.	179
CASE 6.2: The Complaint Letter	180
CASE 6.3: The Helsinki Museum of Art and Design	182
Selected Bibliography	183
Endnotes	185

Chapter 7

Process Improvement 187

Learning Objectives	187
Chapter Preview	187
Quality and Productivity Improvement Process	188
<i>Foundations of Continuous Improvement</i>	188
<i>Plan-Do-Check-Act (PDCA) Cycle</i>	188
<i>Problem Solving</i>	189

Quality Tools for Analysis and Problem Solving 190

<i>Check Sheet</i>	190
<i>Run Chart</i>	190
<i>Histogram</i>	190
<i>Pareto Chart</i>	191
<i>Flowchart</i>	191
<i>Cause-and-Effect Diagram</i>	192
<i>Scatter Diagram</i>	193
<i>Control Chart</i>	193
Benchmarking	194
Improvement Programs	195
<i>Deming's 14-Point Program</i>	195
<i>ISO 9001</i>	196
<i>Six Sigma</i>	196
<i>Lean Service</i>	200
Service Benchmark: When Something Doesn't Work—Sometimes Just Hit it with a Hammer!	203
Summary	203
Key Terms and Definitions	204
Topics for Discussion	204
Interactive Exercise	204
CASE 7.1: Sonora County Sheriff	204
CASE 7.2: Mega Bytes Restaurant	205
Chapter 7 Supplement: Data Envelopment Analysis (DEA) 209	
Measuring Service Productivity	209
<i>The DEA Model</i>	209
<i>DEA and Strategic Planning</i>	215
Exercises	216
CASE 7.3: Mid-Atlantic Bus Lines	216
Selected Bibliography	217
Endnotes	218

Chapter 8

Service Facility Location 219

Learning Objectives	219
Chapter Preview	219
Strategic Location Considerations	220
<i>Competitive Clustering</i>	220
<i>Saturation Marketing</i>	220
<i>Marketing Intermediaries</i>	221
<i>Substitution of Communication for Travel</i>	221
<i>Separation of Front from Back Office</i>	222
<i>Impact of the Internet on Service Location</i>	222
<i>Site Considerations</i>	223
Geographic Information Systems	223
Facility Location Modeling Considerations	225
<i>Geographic Representation</i>	225
<i>Number of Facilities</i>	227
<i>Optimization Criteria</i>	227
Facility Location Techniques	229
<i>Cross-Median Approach for a Single Facility</i>	230
<i>Huff Model for a Retail Outlet</i>	232
<i>Location Set Covering for Multiple Facilities</i>	234

Regression Analysis in Location Decisions	235
Summary	236
Service Benchmark: Here a Bun, There a Bun, Everywhere a Bun-Bun	237
Key Terms and Definitions	237
Topics for Discussion	238
Interactive Exercise	238
Solved Problems	238
Exercises	240
CASE 8.1: Health Maintenance Organization (C)	242
CASE 8.2: Athol Furniture, Inc.	242
Selected Bibliography	245
Endnotes	245

PART THREE

MANAGING SERVICE OPERATIONS 247

Chapter 9

Service Supply Relationships 249

Learning Objectives	249
Chapter Preview	249
Supply Chain Management	250
<i>Network Model</i>	250
<i>Managing Uncertainty</i>	251
<i>Omnichannel Supply Chain</i>	251
Service Supply Relationships	253
<i>Customer-Supplier Duality</i>	253
<i>Service Supply Relationships Are Hubs, Not Chains</i>	254
Managing Service Relationships	254
<i>Bidirectional Optimization</i>	255
<i>Productive Capacity</i>	256
<i>Perishability</i>	256
Social Media in Services	257
<i>Social Media as a Competitive Strategy</i>	258
<i>Social Media and Customer Convenience</i>	258
<i>Social Media for Organizing and Co-creation of Value</i>	259
Professional Service Firms	259
<i>Attributes of Professional Services</i>	259
<i>Service Consulting</i>	260
<i>Operational Characteristics</i>	261
Outsourcing Services	263
<i>Benefits and Risks of Outsourcing Services</i>	264
<i>Classification of Business Services</i>	265
<i>Managerial Considerations with Service Outsourcing</i>	266
Summary	268
Service Benchmark: Citizens Come First in Lynchburg	269
Key Terms and Definitions	269
Topics for Discussion	269
Interactive Exercise	270
CASE 9.1: Boomer Consulting, Inc.	270
CASE 9.2: Evolution of B2C E-Commerce in Japan	272
CASE 9.3: Mortgage Service Game	274
Selected Bibliography	276
Endnotes	276

Chapter 10

Globalization of Services 279

Learning Objectives	279
Chapter Preview	280
Domestic Growth and Expansion Strategies	280
<i>Focused Service</i>	280
<i>Focused Network</i>	281
<i>Clustered Service</i>	281
<i>Diversified Network</i>	282
Franchising	282
<i>The Nature of Franchising</i>	283
<i>Benefits to the Franchisee</i>	283
<i>Issues for the Franchiser</i>	284
Globalization of Services	285
<i>Generic International Strategies</i>	285
<i>The Nature of the Borderless World</i>	287
<i>Planning Transnational Operations</i>	288
Global Service Strategies	290
<i>Multicountry Expansion</i>	291
<i>Importing Customers</i>	292
<i>Following Your Customers</i>	292
<i>Service Offshoring</i>	293
<i>Beating the Clock</i>	293
Service Benchmark: Small World and Other Myths	294
Summary	294
Key Terms and Definitions	295
Topics for Discussion	295
Interactive Exercise	295
CASE 10.1: Goodwill Industries of Central Texas	295
CASE 10.2: FedEx: Tiger International Acquisition	297
Selected Bibliography	300
Endnotes	300

Chapter 11

Managing Capacity and Demand 301

Learning Objectives	301
Chapter Preview	301
Generic Strategies of Level Capacity or Chase Demand	302
Strategies for Managing Demand	302
<i>Customer-Induced Variability</i>	302
<i>Segmenting Demand</i>	303
<i>Offering Price Incentives</i>	304
<i>Promoting Off-Peak Demand</i>	305
<i>Developing Complementary Services</i>	306
<i>Reservation Systems and Overbooking</i>	306
Strategies for Managing Capacity	308
<i>Defining Service Capacity</i>	308
<i>Daily Workshift Scheduling</i>	309
<i>Weekly Workshift Scheduling with Days-Off Constraint</i>	311
<i>Increasing Customer Participation</i>	312
<i>Creating Adjustable Capacity</i>	313
<i>Sharing Capacity</i>	313

<i>Cross-Training Employees</i>	313
<i>Using Part-Time Employees</i>	313
Yield Management	315
<i>Yield Management Applications</i>	319
Service Benchmark: Pay Up Front and Take Your Chances	320
Summary	320
Key Terms and Definitions	321
Topics for Discussion	321
Interactive Exercise	321
Solved Problems	321
Exercises	323
CASE 11.1: River City National Bank	325
CASE 11.2: Gateway International Airport	327
CASE 11.3: The Yield Management Analyst	328
CASE 11.4: Sequoia Airlines	331
Selected Bibliography	332
Endnotes	333

Chapter 12

Managing Waiting Lines 335

Learning Objectives	335
Chapter Preview	335
The Economics of Waiting	336
Queuing Systems	336
Strategies for Managing Customer Waiting	337
<i>The Psychology of Waiting</i>	337
<i>That Old Empty Feeling</i>	338
<i>A Foot in the Door</i>	338
<i>The Light at the End of the Tunnel</i>	339
<i>Excuse Me, but I Was Next</i>	340
Essential Features of Queuing Systems	340
<i>Calling Population</i>	341
<i>Arrival Process</i>	342
<i>Queue Configuration</i>	345
<i>Queue Discipline</i>	346
<i>Service Process</i>	349
Summary	350
Service Benchmark: The Magic of Disney Makes Queues Disappear	351
Key Terms and Definitions	351
Topics for Discussion	351
Interactive Exercise	351
Solved Problem	351
Exercises	352
CASE 12.1: Thrifty Car Rental	352
CASE 12.2: Eye'll Be Seeing You	353
CASE 12.3: Field Study	354
Selected Bibliography	354
Endnotes	355

Chapter 13

Capacity Planning and Queuing Models 357

Learning Objectives	357
Chapter Preview	358

Capacity Planning	358
<i>Strategic Role of Capacity Decisions</i>	359
Analytical Queuing Models	360
<i>Relationships among System Characteristics</i>	362
<i>Standard M/M/1 Model</i>	362
<i>Standard M/M/c Model</i>	364
<i>M/G/1 Model</i>	367
<i>General Self-Service M/G/∞ Model</i>	368
<i>Finite-Queue M/M/1 Model</i>	368
<i>Finite-Queue M/M/c Model</i>	369
Capacity Planning Criteria	370
<i>Average Customer Waiting Time</i>	370
<i>Probability of Excessive Waiting</i>	371
<i>Minimizing the Sum of Customer Waiting Costs and Service Costs</i>	372
<i>Probability of Sales Lost Because of Inadequate Waiting Area</i>	373
Service Benchmark: Don't Guesstimate, Simulate!	374
Summary	375
Key Terms and Definitions	375
Topics for Discussion	375
Interactive Exercise	375
Solved Problems	375
Exercises	377
CASE 13.1: Houston Port Authority	380
CASE 13.2: Freedom Express	380
CASE 13.3: Renaissance Clinic (A)	381
Chapter 13 Supplement: Computer Simulation 382	
Systems Simulation	382
<i>Simulation Methodology</i>	383
<i>Monte Carlo Simulation</i>	384
<i>Generating Random Variables</i>	384
<i>Discrete Random Variable</i>	385
<i>Continuous Random Variable</i>	386
<i>Discrete-Event Simulation</i>	387
Process Simulator by ProModel	389
Solved Problems	391
Exercises	394
CASE 13.4: Drivers License Renewal	397
CASE 13.5: Renaissance Clinic (B)	398
Selected Bibliography	398
Endnotes	399

PART FOUR

Quantitative Models for Service Management 401

Chapter 14

Forecasting Demand for Services 403

Learning Objectives	403
Chapter Preview	403
The Choice of Forecasting Method	404
Subjective Models	404
<i>Delphi Method</i>	405
<i>Cross-Impact Analysis</i>	406
<i>Historical Analogy</i>	406

Causal Models	407
<i>Regression Models</i>	407
<i>Econometric Models</i>	408
Time Series Models	408
<i>N-Period Moving Average</i>	408
<i>Simple Exponential Smoothing</i>	409
<i>Forecast Error</i>	411
<i>Relationship Between α and N</i>	412
<i>Exponential Smoothing with Trend Adjustment</i>	413
<i>Exponential Smoothing with Seasonal Adjustment</i>	414
<i>Exponential Smoothing with Trend and Seasonal Adjustments</i>	416
<i>Summary of Exponential Smoothing</i>	418
Summary	418
Service Benchmark: Googling the Future	419
Key Terms and Definitions	419
Topics for Discussion	419
Interactive Exercise	420
Solved Problems	420
Exercises	422
CASE 14.1: Oak Hollow Medical Evaluation Center	423
CASE 14.2: Gnomial Functions, Inc.	424
Selected Bibliography	425
Endnotes	426

Chapter 15

Managing Service Inventory 427

Learning Objectives	427
Chapter Preview	428
Inventory Theory	429
<i>Role of Inventory in Services</i>	429
<i>Characteristics of Inventory Systems</i>	430
<i>Relevant Costs of an Inventory System</i>	431
Order Quantity Models	432
<i>Economic Order Quantity</i>	433
<i>Inventory Model with Quantity Discounts</i>	435
<i>Inventory Model with Planned Shortages</i>	437
Inventory Management under Uncertainty	440
Inventory Control Systems	441
<i>Continuous Review System</i>	441
<i>Periodic Review System</i>	442
<i>The ABCs of Inventory Control</i>	444
Radio Frequency Identification	445
Single-Period Model for Perishable Goods	446
<i>Expected Value Analysis</i>	446
<i>Marginal Analysis</i>	447
Retail Discounting Model	448
Service Benchmark: Your Bag Is Tagged	450
Summary	450
Key Terms and Definitions	450
Topics for Discussion	451
Interactive Exercise	451
Solved Problems	451
Exercises	453
CASE 15.1: A.D. Small Consulting	458
CASE 15.2: Last Resort Restaurant	458

CASE 15.3: Elysian Cycles	459
Selected Bibliography	460
Endnotes	460

Chapter 16

Managing Service Projects 461

Learning Objectives	461
Chapter Preview	461
The Nature of Project Management	462
<i>Characteristics of Projects</i>	462
<i>Project Management Process</i>	462
<i>Selecting the Project Manager</i>	463
<i>Building the Project Team</i>	463
<i>Principles of Effective Project Management</i>	464
Techniques for Project Management	464
<i>Gantt Project Charts</i>	464
<i>A Critique of Gantt Charts</i>	466
<i>Constructing a Project Network</i>	466
<i>Critical Path Method</i>	467
<i>Microsoft Project Analysis</i>	470
Resource Constraints	473
Activity Crashing	473
Incorporating Uncertainty in Activity Times	478
<i>Estimating Activity Duration Distributions</i>	478
<i>Project Completion Time Distribution</i>	479
<i>A Critique of the Project Completion Time Analysis</i>	480
Problems with Implementing Critical Path Analysis	482
Monitoring Projects	482
<i>Earned Value Chart</i>	483
<i>Project Termination</i>	483
<i>Project History Report</i>	484
Service Benchmark: The House That Warren Built	484
Summary	484
Key Terms and Definitions	485
Topics for Discussion	485
Interactive Exercise	485
Solved Problems	485
Exercises	487
CASE 16.1: Info-Systems, Inc.	491
CASE 16.2: Whittier County Hospital	492
Selected Bibliography	494
Endnote	494
Appendix A: Areas of Standard Normal Distribution	495
Appendix B: Uniformly Distributed Random Numbers [0, 1]	496
Appendix C: Values of L_q for the $M/M/c$ Queuing Model	497
Appendix D: Equations for Selected Queuing Models	499
Name Index	505
Subject Index	509