

DETAILED TABLE OF CONTENTS

SECTION 1 STRATEGY

Twenty-first Century Operations and Supply Management 2

1 INTRODUCTION TO OPERATIONS AND SUPPLY MANAGEMENT 3

What is Operations and Supply Management? 4

Operations and Supply Management: A Critical Responsibility of Every Manager 5

Operations and Supply Management in Practice: Letters from Two MBA Students at the University of Calgary 6

Efficiency, Effectiveness, and Value 7

Supply Chain Transformation Processes 8

Operations and Supply Management in Practice: Products and Processes Should be for People, Not the Other Way Around 10

Differences Between Services and Goods 11

The Goods-Services Continuum 11

Growth of Services 12

Operations and Supply Management in Practice: Service Providers Increase Operations Effectiveness and Profitability by Adopting Principles from Manufacturing 13

The Evolution of Operations and Supply Management from an International and Canadian Perspective 13

Current Issues in Operations and Supply Management 16

SUMMARY 17

KEY TERMS 18

REVIEW AND DISCUSSION QUESTIONS 18

CASE: SPLIT DECISION: HOW BACK TO BASICS SUPPLY CHAIN MANAGEMENT CAN SAVE A LOT OF DOUGH 19

SELECTED BIBLIOGRAPHY 20

2 OPERATIONS AND SUPPLY STRATEGY 21

Steelmaker Dofasco Does a Turnaround Through Strategic Refocusing 21

What is Operations and Supply Strategy? 22

Competitive Dimensions 22

The Notion of Trade-Offs 24

Operations and Supply Management in Practice: Zara Excels on Price, Speed, and Flexibility 25

Order Winners and Order Qualifiers: The Marketing–Operations Link 26

Strategic Fit: Fitting Operational Activities to Strategy 26

Operations and Supply Management in Practice: How IKEA Designs Its Attractive Prices 27

A Framework for Operations and Supply Strategy 28

How Does Bay Street Evaluate Operations Performance? 29

SUMMARY 30

KEY TERMS 30

REVIEW AND DISCUSSION QUESTIONS 31

INTERNET EXERCISE: HARLEY-DAVIDSON MOTORCYCLES 31

CASE: LASIK VISION CORP. 32

SELECTED BIBLIOGRAPHY 33

3 PROJECT MANAGEMENT 34

EllisDon Offers Total Project Management 34

Operations and Supply Management in Practice: Apple's iPod Has Its Own Product Development Team 37

What is Project Management? 37

Types of Project Organization Structures 38

Pure Project 38

Functional Project 38

Matrix Project 39

Work Breakdown Structure 40

Operations and Supply Management in Practice: Every Project Needs to Manage Risks 43

Project Control Charts 43

Operations and Supply Management in Practice: Using Project Management Principles to Manage Your Group Term Paper 45

Network-Planning Models 45

Critical Path Method (CPM) 46

Time–Cost Models 51

Operations and Supply Management in Practice: Everybody Uses Slack Time; The Key is to Use It Wisely 52

CPM in Practice 55

Managing Resources 56

Tracking Progress 56

Operations and Supply Management in Practice: Project Management Information Systems 57

SUMMARY 58
 KEY TERMS 58
 SOLVED PROBLEMS 58
 REVIEW AND DISCUSSION QUESTIONS 61
 PROBLEMS 61
 ADVANCED PROBLEM 65
 CASE: CELL PHONE DESIGN PROJECT 66
 SELECTED BIBLIOGRAPHY 67

SECTION 2 PROCESSES

Processes 68

4 STRATEGIC CAPACITY MANAGEMENT 69

Shouldice Hospital: Hernia Surgery Innovation 69
 Capacity Management in Operations 70
 Capacity Planning Concepts 71
 Economies and Diseconomies of Scale 72
 Capacity Focus 72
 Capacity Flexibility 73
 The Learning Curve 74
 Plotting Learning Curves 75
 Learning Curve Tables 77
 Capacity Planning 78
 Considerations in Adding Capacity 78
 Determining Capacity Requirements 79
 Using Decision Trees to Evaluate Capacity Alternatives 81
 Planning Service Capacity 85
 Capacity Planning in Service versus Manufacturing 85
 Capacity Utilization and Service Quality 85
 SUMMARY 86
 KEY TERMS 87
 SOLVED PROBLEMS 87
 REVIEW AND DISCUSSION QUESTIONS 90
 PROBLEMS 90
 CASE: SHOULDICE HOSPITAL—A CUT ABOVE 94
 SELECTED BIBLIOGRAPHY 95

5 STRATEGIC PROCESS DESIGN 96

Toshiba: Producer of the First Notebook Computer 96
 How Production Processes are Organized 97
 Break-Even Analysis 99
 Designing a Production System 101
 Project Layout 101
 Workcentres 101
 Manufacturing Cell 101
 Assembly Line and Continuous Process Layouts 102
 An Operational Classification of Services 104
 Operations and Supply Management in Practice: Supply Chain Services at DHL 105
 Designing Service Organizations 105
 Structuring the Service Encounter: Service System Design Matrix 106

Assembly-Line Design 107
 Operations and Supply Management in Practice: What's It Like Working on an Assembly Line? 108
 Splitting Tasks 112
 Flexible and U-shaped Line Layouts 112
 Mixed-Model Line Balancing 112
 Operations and Supply Management in Practice: Improved Layouts Help any Facility—Manufacturing, Distribution, or Service 114
 Workcentre (Process) Layout Design 115

SUMMARY 119
 KEY TERMS 120
 SOLVED PROBLEMS 120
 REVIEW AND DISCUSSION QUESTIONS 124
 PROBLEMS 125
 ADVANCED PROBLEMS 128
 CASE 1: DESIGNING TOSHIBA'S NOTEBOOK COMPUTER LINE 129
 CASE 2: FIRST DETECT: LINKING PRODUCT STRATEGY AND PROCESS DESIGN 132
 SELECTED BIBLIOGRAPHY 133

S5 WAITING-LINE ANALYSIS 134

The Waiting-Line Problem 134
 The Practical View of Waiting Lines 134
 The Queuing System 136
 Customer Arrivals 136
 Distribution of Arrivals 137
 The Queuing System: Factors 140
 Exiting the Queuing System 143
 Waiting-Line Models 143
 Computer Simulation of Waiting Lines 148
 SUMMARY 150
 KEY TERMS 150
 FORMULA REVIEW 150
 SOLVED PROBLEMS 151
 REVIEW AND DISCUSSION QUESTIONS 152
 PROBLEMS 152
 CASE: COMMUNITY HOSPITAL EVENING OPERATING ROOM 156
 SELECTED BIBLIOGRAPHY 156

6 PROCESS ANALYSIS 157

Faster Service Has Benefits and Costs 157
 Process Analysis 158
 Process Flowcharting 159
 Cycle Time and Utilization 160
 Types of Processes 160
 Buffering, Blocking, and Starving 161
 Make-to-Stock versus Make-to-Order 162
 Operations and Supply Management in Practice: Design Your Own Surveillance Camera on the Web 165
 Measuring Process Performance 166
 SUMMARY 169
 KEY TERMS 170
 SOLVED PROBLEMS 170

REVIEW AND DISCUSSION QUESTIONS 172
 PROBLEMS 172
 CASE 1: KRISTEN'S COOKIE COMPANY (A) 174
 CASE 2: CANADIAN BLOOD SERVICES (CBS) 176
 SELECTED BIBLIOGRAPHY 176

7 MANAGING QUALITY 177

GE Six-Sigma Supply Chain Processes 177
 Total Quality Management 178
 Operations and Supply Management in Practice:
 TQM and Leadership at High Liner Foods 179
 Quality Specification and Quality Costs 180
 Developing Quality Specifications 180
 Operations and Supply Management in
 Practice: J.D. Power and Associates
 Redefines Quality 182
 Cost of Quality 183
 International Quality Management Systems
 Standards 184
 ISO 9000 184
 Operations and Supply Management in Practice:
 Cost of Poor Quality 186
 ISO 9000 Certification 186
 ISO 14000 Series 187
 Recognition for Good Organization-Wide
 Quality 187
 Canada Awards for Excellence 188
 Six-Sigma Quality 189
 Operations and Supply Management in Practice:
 Canada's National Quality Institute (NQI) 189
 Six-Sigma Methodology 190
 Analytical Tools for Six Sigma 191
 Statistical Quality Control 195
 Variation Around Us 196
 Process Capability 198
 Process Control Procedures 203
 Process Control with Attribute Measurements:
 Using p Charts 205
 Process Control with Variable Measurements:
 Using \bar{X} and R Charts 206
 How to Construct \bar{X} and R Charts 208
 Acceptance Sampling 211
 Design of a Single Sampling Plan for Attributes 211
 Operating Characteristic Curves 213
SUMMARY 214
KEY TERMS 215
FORMULA REVIEW 215
SOLVED PROBLEMS 216
REVIEW AND DISCUSSION QUESTIONS 218
PROBLEMS 218
ADVANCED PROBLEM 222
CASE 1: HANK KOLB, DIRECTOR OF QUALITY
ASSURANCE 222
CASE 2: SHORTENING CUSTOMERS'
TELEPHONE WAITING TIME 224
SELECTED BIBLIOGRAPHY 227

SECTION 3 SUPPLY CHAINS

Why Having an Effective Supply Chain Matters 228

8 SUPPLY CHAIN STRATEGY 230

The World is Flat 230
 What is Supply Chain Management? 231
 Operations and Supply Management in Practice:
 Could Better Supply Chain Management have Saved
 More *Titanic* Lives? 232
 Designing the Supply Chain 233
 Sourcing 233
 Operations and Supply Management in Practice: The
 One-Size-Fits-All Supply Chain Does Not Exist 238
 Logistics and Inventory Management 240
 Vertical Integration and Outsourcing 241
 Measuring Supply Chain Performance 245
 Product Design to Facilitate Supply Chain
 Management 248
 Information Systems in Supply Chain
 Management 250
 Collaborative Planning, Forecasting, and Replenishment
 (CPFR) 250
 Operations and Supply Management in Practice:
 Collaborative Forecasting and Planning for Smooth
 Sailing 252
 The Reverse Supply Chain 253
 Integrating It All: The Successful Supply Chain 254
SUMMARY 255
KEY TERMS 255
FORMULA REVIEW 256
REVIEW AND DISCUSSION QUESTIONS 256
PROBLEMS 256
CASE: PEPE JEANS 257
SELECTED BIBLIOGRAPHY 259

9 LOGISTICS 260

Logistics Providers are Providing More Value-Added
 Services 260
 Logistics 261
 Decisions Related to Logistics 261
 Issues in Facility Location 263
 Operations and Supply Management in Practice:
 Toyota Chooses Woodstock, Ontario, for its
 New Assembly Plant 265
 Operations and Supply Management in Practice:
 Evolution of a Global Location Strategy at
 a Winnipeg Furniture Maker 266
 Plant Location Methods 267
 Factor-Rating Systems 267
 Transportation Method of Linear Programming 268
 Centroid method 272
 Locating Service Facilities 274
SUMMARY 276
KEY TERMS 277

FORMULA REVIEW 277
 SOLVED PROBLEM 277
 REVIEW AND DISCUSSION QUESTIONS 278
 PROBLEMS 279
 CASE: APPLICHEM—THE TRANSPORTATION
 PROBLEM 280
 SELECTED BIBLIOGRAPHY 281

10 LEAN (JIT) OPERATIONS 282

Lean Six Sigma at Solectron 282
 Lean Logic 283
 The Toyota Production System 284
 Elimination of Waste 284
 JIT Production 286
 Operations and Supply Management in Practice: Small-
 Lot Principle Applies to Information Too! 288
 Focus on Quality 291
 Lean Process and Product Design 292
 Workforce Involvement 296
 Close Supplier Relationships 296
 Operations and Supply Management in Practice:
 Employee Suggestions Pay Off at Canada Post 296
 Operations and Supply Management in Practice: JIT at
 Toyota's North American Plants 297
 Problem Solving and Continuous Process Improvement 299
 Lean Services 300
 SUMMARY 301
 KEY TERMS 302
 REVIEW AND DISCUSSION QUESTIONS 302
 CASE: CHENG PARTS COMPANY 303
 SELECTED BIBLIOGRAPHY 305

SECTION 4 MEDIUM- AND SHORT- RANGE OPERATIONS PLANNING

In Running a Business, Computers Can Do More Than
 Just Word Processing and E-Mail 306

11 DEMAND MANAGEMENT AND FORECASTING 307

WalMart's Data Warehouse 307
 Demand Management 308
 Types of Forecasting 309
 Components of Demand 309
 Qualitative Techniques in Forecasting 311
 Market Research 311
 Panel Consensus 312
 Historical Analogy 312
 Operations and Supply Management in Practice:
 Forecasting for Short-Lived Products at Hewlett
 Packard 312
 Delphi Method 313

Time Series Analysis 313
 Simple Moving Average 314
 Weighted Moving Average 316
 Exponential Smoothing 317
 Forecast Errors 321
 Sources of Error 321
 Measurement of Error 321
 Linear Regression Analysis 323
 Operations and Supply Management in Practice:
 Forecasting in Services 324

SUMMARY 328
 KEY TERMS 329
 FORMULA REVIEW 329
 SOLVED PROBLEMS 330
 REVIEW AND DISCUSSION QUESTIONS 332
 PROBLEMS 332
 CASE: ALTAVOX ELECTRONICS 337
 SELECTED BIBLIOGRAPHY 338

12 AGGREGATE SALES AND OPERATIONS PLANNING 339

Aggregate Planning 339
 What is Sales and Operations Planning? 340
 Overview of Sales and Operations Planning
 Activities 341
 The Aggregate Operations Plan 342
 Production Planning Environment 343
 Relevant Costs 345
 Operations and Supply Management in Practice:
 It's All in the Planning 346
 Aggregate Planning Techniques 346
 Operations and Supply Management in Practice:
 Medium-Term Production and Inventory Planning
 at Kellogg's 346
 A Cut-and-Try Example: The JCB Company 347
 Level Scheduling 353
 Aggregate Planning in Practice 354
 Yield Management 355

SUMMARY 357
 KEY TERMS 357
 SOLVED PROBLEM 357
 REVIEW AND DISCUSSION QUESTIONS 360
 PROBLEMS 360
 CASE: BRADFORD MANUFACTURING—PLANNING
 PLANT PRODUCTION 364
 SELECTED BIBLIOGRAPHY 365

13 INVENTORY CONTROL 366

Hospitals Hope to Save by Effective Inventory
 Management 366
 Definition of Inventory 369
 Purposes of Inventory 369
 Inventory Costs 370
 Independent versus Dependent Demand 371

Inventory Systems 372
 A Single-Period Inventory Model 372
 Multiperiod Inventory Systems 375
Fixed-Order-Quantity Models 377
 Determining Optimal Order Quantities 377
Operations and Supply Management in Practice:
Determining Optimal Lot Sizes in Practice 380
 Fixed-Order-Quantity Model with Safety Stock 381
Fixed-Time-Period Models 387
 Fixed-Time-Period Models with Safety Stock 387
Inventory Control and Supply Chain
Management 389
 ABC Inventory Planning 391
 Inventory Accuracy and Cycle Counting 393
SUMMARY 394
KEY TERMS 395
FORMULA REVIEW 395
SOLVED PROBLEMS 396
REVIEW AND DISCUSSION QUESTIONS 398
PROBLEMS 399
CASE 1: BATCHING PATIENTS FOR MRI EXAMS
BECAUSE OF SET-UP TIME 404
CASE 2: MERDEKA GAS GRILLS: INVENTORY AND
SUPPLY CHAIN MANAGEMENT 405
CASE 3: HEWLETT-PACKARD—SUPPLYING THE
DESKJET PRINTER IN EUROPE 406
SELECTED BIBLIOGRAPHY 408

14 MATERIAL REQUIREMENTS PLANNING 409

From Push to Pull 409
 Where MRP Can Be Used 411
Operations and Supply Management in Practice:
Manufacturing Your Own MRP System to Help
Manufacturing 412

Material Requirements Planning System Structure 412
 Demand for Products 412
 Bill of Materials 413
 Inventory Records 417
 MRP Computer Program 418
An Example Using MRP 419
 Forecasting Demand 419
 Developing a Master Production Schedule 419
 Bill of Materials (Product Structure) 420
 Inventory Records 420
 Performing the MRP Calculations 421
Lot Sizing in MRP Systems 423
 Lot-for-Lot 424
 Economic Order Quantity 424
 Choosing the Best Lot Size 425
Capacity Requirements Planning (CRP) 425
Manufacturing Resource Planning (MRP II) 426
Distribution Requirements Planning (DRP) 427
MRP and JIT 427
SUMMARY 427
KEY TERMS 428
SOLVED PROBLEMS 428
REVIEW AND DISCUSSION QUESTIONS 430
PROBLEMS 430
CASE 1: BRUNSWICK MOTORS, INC.—AN
INTRODUCTORY CASE FOR MRP 434
CASE 2: MERDEKA GAS GRILLS: IMPLEMENTING
MRP 435
SELECTED BIBLIOGRAPHY 435

PHOTO CREDITS 436

NAME INDEX 437

SUBJECT INDEX 439