

# LEAN SIX SIGMA LOGISTICS

*Strategic  
Development  
to Operational  
Success*

*by*

*Dr. Thomas Goldsby • Robert Martichenko*

# TABLE OF CONTENTS

---

Preface .....	xi	
Acknowledgments .....	xiii	
About the Authors .....	xv	
Web Added Value™ .....	xvii	
<b>Section 1. Lean Six Sigma Logistics: Why Bother?</b>		
<i>Chapter 1. What Is Lean Six Sigma Logistics?</i> .....	3	
What Is Logistics? .....	4	
What Is Lean? .....	4	
Lean and the Logistician .....	4	
What Is Six Sigma? .....	5	
Six Sigma and the Logistician .....	5	
What Is Lean Six Sigma Logistics? .....	6	
The Logistics Bridge Model .....	7	
<i>Chapter 2. The Importance of Logistics and Supply Chain Management</i> .....		9
Discovering the Dark Continent of Logistics .....	9	
This Thing Called “Supply Chain Management” .....	11	
The Logistics Wastes .....	14	
<b>Section 2. The Logistics Wastes</b>		
<i>Chapter 3. The Waste of Inventory</i> .....	19	
Logistics and Inventory Management .....	19	
The Temptation of Inventory .....	20	
The Costs of Holding Inventory .....	22	

*Chapter 4. The Waste of Transportation* ..... 27  
Logistics and Transportation Management ..... 27  
Transportation and Logistics Trade-offs ..... 29  
Transportation Carrier Relationships ..... 31  
Minimizing the Day-to-Day Wastes in Transportation ..... 32

*Chapter 5. The Waste of Space and Facilities* ..... 35  
Logistics and Warehousing ..... 35  
How Many Facilities? How Much Space? ..... 36  
Are Advanced Technologies a Cure or Merely a Crutch? ..... 37

*Chapter 6. The Waste of Time* ..... 39  
Logistics and Time Wastes ..... 39  
    Order Transmission ..... 39  
    Order Processing ..... 41  
    Order Filling ..... 42  
    Order Staging and Verification ..... 43  
    Order Shipping and Delivery ..... 44

*Chapter 7. The Waste of Packaging* ..... 47  
Logistics and Product Packaging ..... 47  
Packaging as a Source of Waste ..... 48  
Packaging as a Waste ..... 49  
Packaging as a Visual Control ..... 50

*Chapter 8. The Waste of Administration* ..... 51  
Logistics and Administration ..... 51  
Administration as Help and Hindrance ..... 52  
Technology and Administration ..... 52

*Chapter 9. The Waste of Knowledge* ..... 55  
Logistics and Knowledge ..... 55  
Cultivating Knowledge ..... 56  
Managing the Flow of Knowledge ..... 57  
The River of Wastes ..... 59

**Section 3. The Logistics Bridge Model**

*Chapter 10. A Tour of the Bridge* ..... 65  
History of Lean Six Sigma Logistics ..... 66

The Importance of the Logistics Bridge Model .....	66
The CEO's Perspective .....	67
The Implementer's Perspective .....	69
The Logistics Bridge Model: Getting Started .....	70
<i>Chapter 11. Logistics Flow: Asset Flow</i> .....	71
People Flow .....	72
The People "Perfect Order" .....	73
Organizing People .....	73
Bridging the People Gap .....	74
Inventory Flow .....	75
Understanding Safety Stock .....	76
Inventory Management .....	77
Starting with the Systems Approach .....	77
Inventory and Cause and Effect .....	78
Inventory Management Fundamentals .....	79
Fixed Resources Flow .....	80
Identifying and Mapping Fixed Resources .....	81
Questioning the Need .....	82
Vision of Excellence and Fixed Resource Flow .....	83
<i>Chapter 12. Flow: Information Flow</i> .....	85
Data Flow .....	86
Historical Data .....	86
Event and Real-Time Data .....	87
Future and Deterministic Data .....	87
Data Excellence .....	89
Knowledge Flow .....	89
Continuous Improvement and Knowledge Flow .....	90
Standardized Work and Knowledge Sharing .....	91
Getting Knowledge to Flow .....	92
Communication Flow .....	93
Strategic Communication .....	93
Hoshin Planning .....	94
Operational Communication .....	95
<i>Chapter 13. Flow: Financial Flow</i> .....	97
Income Statement Flow .....	98
Logistics Activities and Hidden Operating Costs .....	99

- Logistics Costs Flow Across the Organization ..... 100
- Inventory Carrying Costs and the Income Statement ..... 101
- Vision of Excellence and the Income Statement ..... 102
- Balance Sheet Flow ..... 103
  - Inventory as a Current Asset ..... 104
  - Inventory Turns and the Balance Sheet ..... 105
  - The Balance Sheet and Business Strategy ..... 106
    - Flexibility ..... 106
    - Visibility ..... 107
- Cash Flow ..... 107
  - Cash Flow Drivers ..... 108
    - Accounts Payable and Cash ..... 108
    - Accounts Receivable and Cash ..... 110
    - Revenue Growth and Cash ..... 110
    - Gross Margin and Cash Flow ..... 111
    - Selling, General, and Administrative Expense and Cash Flow ..... 111
    - Capital Expenditure and Cash Flow ..... 112
    - Inventory and Cash Flow ..... 113
  - Vision of Excellence and Cash Flow ..... 113
- Chapter 14. Capability: Predictability* ..... 115
  - Organization ..... 116
    - Highlighting Waste and Creating Visibility ..... 117
    - Standardized Operations and Setting Priorities ..... 118
    - The Organized Workplace: Clutter, Complexity, and Quality ..... 119
    - Measurement and the Organized Workplace ..... 119
  - Coordination ..... 120
    - Coordination and Value Stream Mapping ..... 121
    - Coordination and Detailed Planning ..... 122
    - Coordination and Measurement ..... 124
  - Complexity ..... 124
    - Complexity of Products ..... 125
    - Complexity of Processes ..... 126
- Chapter 15. Capability: Stability* ..... 129
  - Standardization ..... 130
    - The Key Aspects of Standardization ..... 130
    - Standardization and Continuous Improvement ..... 131
  - Flexibility ..... 132
    - Developing Flexibility and Back to Basics ..... 133

Flexibility and Lead Time .....	134
Logistics Infrastructure Flexibility .....	135
Planned Network Design and Visibility .....	136
Control .....	137
Today's Capability Is the System's Capability .....	138
Common and Special Cause Variation .....	139
<i>Chapter 16. Capability: Visibility</i> .....	141
Understandability .....	142
Beginning to Understand .....	143
Channel Partners and Their Important Role .....	143
Opportunities and the Moment of Truth .....	144
Measurability .....	145
Voice of the Customer .....	146
Creating Internal Measures of Meaning .....	148
Actionability .....	149
<i>Chapter 17. Discipline: Collaboration</i> .....	153
Teamwork .....	154
Processes and Knowing the Customer .....	155
Building Teams .....	156
Complementary Skills and Opposing Views .....	156
Natural Stages of Team Development .....	157
Strategic Sourcing .....	158
Raw Material Suppliers .....	159
Standardization, Complexity, and Dual Sourcing .....	160
Beware the Term "Partnership" .....	160
Collaboration and Logistics Services .....	161
Third-Party Logistics .....	162
Developing a Lean Third-Party Logistics Relationship .....	163
Project Management .....	165
Project Management: The Basics .....	166
Meeting Agenda (Compass) .....	167
Storyboard .....	167
Gantt Chart .....	168
Failure Mode and Effects Analysis .....	169
<i>Chapter 18. Discipline: Systems Optimization</i> .....	173
Total Cost .....	174
Explicit and Implicit Costs .....	174

Horizontal Integration .....	177
Perceived Difficulty and System Constraints .....	179
Compensation and Incentive Programs .....	179
Teamwork, Imperfection, and Defensive Behavior .....	180
Breaking Down the Walls .....	181
Vertical Integration .....	181
From Customer to Supplier .....	182
Vertical Integration and Information .....	182
Variability, Leveled Flow, and Vertical Integration .....	183
<i>Chapter 19. Discipline: Waste Elimination</i> .....	185
Quality at the Source .....	186
The Benefits of Quality at the Source .....	187
Logistics and Quality at the Source .....	189
Continuous Improvement .....	190
Continuous Improvement: The Bare Facts .....	190
The Challenges of Continuous Improvement Implementation .....	192
Bridging the Gap .....	193
Getting People Trained .....	194
Execution .....	195
Acting as Lean Six Sigma Logistics Leaders .....	195
<b>Section 4. Building the Bridge: Lean Six Sigma Logistics Tools</b>	
<i>Chapter 20. Strategy and Planning Tools</i> .....	201
Surveying the Tool Kit .....	201
Voice of the Customer .....	202
Voice of the Business .....	204
Value Stream Mapping .....	206
Pareto Analysis and ABC Classification .....	208
The XY Matrix .....	211
<i>Chapter 21. Problem-Solving Tools</i> .....	213
DMAIC (Define-Measure-Analyze-Improve-Control) .....	213
Define .....	214
Measure .....	214
Analyze .....	215
Improve .....	216
Control .....	217
Causal Analysis Tools .....	218
Brainstorming .....	218
Cause-and-Effect Diagrams .....	219

---

Five-Why Analysis .....	220
Design of Experiments .....	222
Inferential Statistics .....	223
<i>Chapter 22. Operational Tools .....</i>	<i>227</i>
Flow Concepts .....	227
Just-in-Time and the Pull System .....	227
Lead-Time Management, Speed, and Flexibility .....	229
Leveled Flow .....	230
Frequency and Lot Size .....	232
Organization Concepts .....	232
Standardized Work Plan .....	233
The SIMPOC Model .....	233
5S Organization and Visual Control .....	234
Red Tag Initiatives .....	235
Poka-Yoke .....	236
<i>Chapter 23. Measurement Tools .....</i>	<i>237</i>
Data Collection Plan .....	237
Process Capability .....	238
Defects per Million Opportunities .....	241
Sigma Calculations .....	242
Conventional Measures of Logistics Performance .....	245
Total Cost Analysis .....	246
<i>Chapter 24. Case Study: GoldSMART Products, Inc. ....</i>	<i>249</i>
Lean Six Sigma Logistics: A Real-World Story .....	249
GoldSMART Products, Inc.: A Case in Lean Six Sigma Logistics .....	250
The Calm Before the Storm .....	250
The Approach of Ominous Clouds .....	251
In the Eye of the Storm .....	252
Riding Out the Storm .....	255
Seeing Daylight Again .....	260
<i>Chapter 25. Summary and Conclusion .....</i>	<i>267</i>
<i>Index .....</i>	<i>271</i>