**Third Edition** 

# The Logistics and Supply Chain Toolkit

Over 100 tools for transport, warehousing and inventory management

Gwynne Richards and Susan Grinsted



# CONTENTS

List of tools x Acknowledgements xiv

### Introduction 1

# 01 Warehouse management tools and guides 4

- 1.1 Warehouse audit 4
- 1.2 5S or 5C, also known as Gemba Kanri 7
- Pareto analysis, 80/20 rule, ABC analysis or the vital few analysis 14
- 1.4 Choosing an order-picking strategy 18
- 1.5 Choosing pick technology 24
- 1.6 Cross-docking 24
- 1.7 Slotting or item profiling 31
- 1.8 Resource planning 35
- 1.9 Task interleaving 40
- 1.10 Selecting warehouse storage equipment 41
- 1.11 Warehouse location numbering 42
- 1.12 Selecting warehouse material handling equipment (MHE) 46
- 1.13 Warehouse space calculations 47
- 1.14 Warehouse location 52
- 1.15 Justifying a warehouse management system (WMS) 55
- 1.16 Selecting a warehouse management system (WMS) 58
- 1.17 How to implement a WMS 66
- 1.18 Warehouse maturity scan, by Jeroen van den Berg 74
- 1.19 Warehouse risk assessments 76
- 1.20 How to 'green' your warehouse and save energy 78
- 1.21 Hazardous packaging and labelling 82
- 1.22 Calculating aisle width for a forklift truck 85

# 02 Transport management tools 88

- 2.1 Transport audit checklists 88
- 2.2 Calculating emissions in freight transport 88

- 2.3 Fuel adjustment factor formula 92
- 2.4 How to improve fuel efficiency 94
- 2.5 Incoterms<sup>®</sup> 2010 98
- 2.6 Load and pallet configuration 101
- 2.7 ISO containers, weight volume ratios and pallets 103
- 2.8 Calculating road freight transport charges and rates 106
- 2.9 Transport management system (TMS) selection process 110
- 2.10 Transport problems matching customer demand with supplier capacity 113
- 2.11 Vendor assurance of transport logistics service providers 116
- 2.12 Drivers' hours regulations, EU and United States 119
- 2.13 Transportation of hazardous products 122
- 2.14 Calculating customs duties 123
- 2.15 How to become an Authorized Economic Operator (AEO) 126

#### 03 Inventory management tools 129

- 3.1 Inventory management audit 129
- 3.2 ABC Pareto analysis for inventory management 133
- 3.3 Ballou's inventory-throughput curve 135
- 3.4 Consignment stock 139
- 3.5 Cycle counting or perpetual inventory counting 142
- 3.6 Maister's rule or the square root rule 145
- 3.7 Measuring demand variation 146
- 3.8 Periodic review inventory management system 150
- 3.9 Reorder point inventory management system 153
- 3.10 Replenishment order quantities 157
- 3.11 Economic order quantity (EOQ), by Geoff Relph 160
- 3.12 Combining Pareto with EOQ to enhance group analysis, by Geoff Relph 164
- 3.13 K-curve (exchange curve inventory planning), by Geoff Relph 166
- 3.14 Safety stock calculation 171
- 3.15 Stock counting 175
- 3.16 Stock turn 179
- 3.17 Vendor-managed inventory (and co-managed inventory) 182

- 3.18 Identification and disposal of surplus stock 185
- 3.19 Managing spare parts inventory 189

## 04 Supply chain management tools 194

- 4.1 Supply chain management audit 194
- 4.2 Collaborative Planning, Forecasting and Replenishment (CPFR<sup>®</sup>) 196
- 4.3 Demand forecasting 199
- 4.4 Factory gate pricing (FGP) 201
- 4.5 Kanban 204
- 4.6 Kraljic matrix 208
- 4.7 Maturity models 211
- 4.8 Postponement 214
- 4.9 Product Flow Path Design, by Fortna 217
- 4.10 SCOR<sup>®</sup> 220
- 4.11 Supplier relationships 223
- 4.12 Supply chain risk assessment 226
- 4.13 Supply chain risk mitigation and contingency planning 231
- 4.14 Sustainable sourcing 234
- 4.15 Theory of constraints 236
- 4.16 Time-based process mapping 239
- 4.17 Time compression 241
- 4.18 Calculating ordering cost 243
- 4.19 How to calculate stockholding cost 246
- 4.20 Sales and operations planning (S&OP) 249
- 4.21 Omni-channel fulfilment 253
- 4.22 Strategic procurement 256
- 4.23 Supply chain strategy, by Julian Amey 259
- 4.24 3D printing or additive manufacturing ROI 263
- 4.25 Supply chain analytics 265

#### **05 Outsourcing tools** 269

- 5.1 Outsourcing 269
- 5.2 To  $4PL^{\odot}$  or not to  $4PL^{\odot}$  273
- 5.3 A risk-based approach to logistics outsourcing 277
- 5.4 Supply chain and logistics outsourcing 279
- 5.5 Non-disclosure agreement (NDA) 282

- 5.6 Outsourcing client questionnaire 285
- 5.7 Logistics services provider (LSP) criteria and decision table 290

#### 06 General management tools 296

- 6.1 Critical path analysis 296
- 6.2 Decision matrix analysis (DMA) 300
- 6.3 DMAIC: a process improvement tool 304
- 6.4 Flow charts 307
- 6.5 Gantt charts 310
- 6.6 Mind maps 313
- 6.7 The PDCA tool 316
- 6.8 Radar chart 323
- 6.9 SWOT analysis 325
- 6.10 Team selection building a successful team, by Belbin 327

#### 07 Performance management tools 331

- 7.1 SMART 331
- 7.2 Performance measurement and quality improvement 333
- 7.3 Performance measures for freight transport 337
- 7.4 Warehouse KPIs 339
- 7.5 Balanced Scorecard 342
- 7.6 Benchmarking 346

#### **08** Financial management tools and ratios 352

- Activity-based costing (ABC) and time-driven activity-based costing (TDABC) 352
- 8.2 Value tree financial model, by Enrico Camerinelli 358
- 8.3 Calculating return on investment and payback period 364
- 8.4 An engineered approach to calculate equipment ROI, by Aaron Lininger 367
- 8.5 Supply chain financial ratios and metrics 372

#### **09 Problem-solving tools** 376

- 9.1 Brainstorming 376
- 9.2 Cause and effect analysis, or fishbone or Ishikawa 379
- 9.3 The 5 Whys 381
- 9.4 The 8-D approach 384

Appendix 1 Useful websites 388 Appendix 2 Imperial/metric conversions 392 Appendix 3 Automatic identification (autoID) 394 Index 399

Additional resources to accompany this text are available at the following URLs. A selection of tools are available at:

www.koganpage.com/TLASCT3

For a comprehensive set of tools go to:

http://howtologistics.com