Index

3D printing 217
3PLs (third-party logistics companies) 134–7
‘asset unencumbered’ 3PLs 140
considerations when selecting 138–9
offering 4PL solutions 137
service innovation 309, 315–16
4D printing 217–8
4PLs (fourth party logistics) 137
9/11 attacks, security concerns 117, 260
80/20 (Pareto) rule 181
A.P. Moller-Maersk 137, 282–3
ABC (activity-based costing) 232
ABC analysis, inventory management system 181–3
access control measures 125–6
activity-based costing (ABC) 232
actuarial approaches 268
Adams, J. 264–5
additive manufacturing 217–8
Adidas 161
advanced shipping notification (ASN) 240
AEOs (authorised economic operators) 124
aerospace industry, supply chain redesign 51–3
AG Barr 194–5
aggregated procurement 51, 52, 147
agile supply chains 64–7
combining with lean 67–70
and RFID technology 212, 214
AGVs (automated guided vehicles) 192
AIDC (automatic identification and data capture) 210
air cargo case study 244–8
air transport sector
freight documentation 138
reducing environmental footprint 285
security issues 124, 127
air trucking 139
airport security 124, 127
airwaybills (AWBs) 138, 235
analytic hierarchy process (AHP) 326
EIB transport project appraisal 366–7
Apple 309–11
Asia, offshoring/outsourcing to 35
ASN (advanced shipping notification) 240
‘asset unencumbered’ 3PLs 140
Australia
contaminants in export grain 347–53
liquor DCs 203
recycling case study 302
Authorised Economic Operators (AEOs) 124
automated guided vehicles (AGVs) 192
automatic identification and data capture (AIDC) 210
see also radio frequency identification automation 209–20
and changing job roles 204–5
electronic data interchange 210
John Lewis case study 239–43
materials handling 196–7
order picking 200
and RFID technology 197, 210–16
storage and retrieval systems 199
and STS principles 202
see also information technology
automotive industry
external integration 46
Jaguar Land Rover case study 89–99
JIT inventory system 185
lean production 61–3
mass customisation 66
backshoring 40, 209
balanced scorecard 230
Baltic Dry Index 327
barcodes 126
  benefits & limitations 214
biometric ID cards 126
global standards for 217
  and WMS data capture 197
base product 65, 69
batch picking 199–200
BCM (business continuity management) 261–2
BCPs see business continuity plans
benchmarking 24–5
bill of lading 235
bill of material (BoM) 157, 225
biometrics 126
Booz Allen Hamilton 118
BPR (business process reengineering) 229, 319
British Airways (BA) 270–1
buffer stock 176
building to order, Dell 78–9
‘bullwhip effect’ 74, 228
  systems thinking 319
Burbridge effect 74
business continuity plans (BCPs) 261–2
  and the millennium bug 258–9
  mitigating disruptions to nodes/links 268
business–humanitarian partnerships 84–6
business process reengineering (BPR) 229, 319
buyers
  motivation 143–4
  role of 151–2
BX Shoes 55
C-TPAT (customs-trade partnership against terrorism) 122, 260
carbon footprint 277–9
cargo rejections, case study 347–53
cargo rotation 252
carmoisine contamination in cargo 348–50
Carr, J. 332
carrying costs 234
category managers 154
centralisation of inventory 177–8
child labour 160
China 30, 35, 156, 157, 307
Christopher, M. 10–11, 12, 64, 67, 68, 69, 72, 73, 320, 334
collaboration 47–50
  methods of 50–3
collaborative planning, forecasting and replenishment (CPFR) 224, 226–7
combined logistics strategies 67–70
generalised costs 139
inventory-related 170–3, 179–80
  plus margin 233
  vs price 155, 157–8
  procurement 155–6
  transportation 105
cost–benefit analysis
  EIB transport project appraisal 360, 366–8
  reverse logistics 300
costing approaches 231–4
costs
  of container shipping 282, 283
  of WMS data capture 197
  of WMS data capture 197
creeping crises 259–60, 272
cross-docking 193–4
  Melbourne case study 252
customisation 64–7, 78–9
  global standards for 217
  WMS data capture 197
dark store 205
data analytics 327
data flows 220, 221–4
  supply chain planning and control 224–9
data integrity, Jaguar Land Rover case study 94
DCs (distribution centres) 107
decision making 326
decision theory 263–4
decoupling point 65, 69–70
delayed product differentiation 178
Dell 77–9
Delphi technique 327
demand
  amplification 74
  Jaguar Land Rover case study 92–3
Demchak, C. 258
Deming, W.E. 62
demurrage charges 113
dependent demand 225
deregulation of transport 5–6
design for manufacture (DFM) 38, 332
design for supply chain efficiency (DSCE) 333
design process, role of supply chains 332–3, 354–7
detection systems, security 126–9
deterministic models 318
DHL 97, 136, 286
directional imbalances, freight 29–31
disaster relief see humanitarian logistics
discrete event models 318
distribution centres (DCs) 107
  Australia liquor DC 203
  John Lewis case study 239–43
  see also warehousing
documentation 235–6
downstream 10–11
drones 128–9
drop box logistics 201
Drucker, P. 7
duty costs 234
dynamic models 318
e-auctions 155
e-business 224–5
e-waste (electronic waste) 290–1, 302
  growth of 290–1
  recycling of 302
  strategic cost/benefit 300
economic growth, link to transport growth 281–2
economic life, EIB transport project appraisal 364–5
economic order quantity (EOQ) model 170–3
economic returns, EIB transport project appraisal 365–6
EDI (electronic data interchange) 210
efficiency
  sustainability issues 283–6
  transport services 113–14
EIB (European Investment Bank) transport project appraisal 358–69
electronic data capture 195, 197
electronic data interchange (EDI) 210
electronic logistics market-places (ELMs) 286
electronic point of sale (EPOS) 69
electronic waste see e-waste
emergency supply chains 81–6
Emma Maersk (container vessel) 282
employee motivation 204
employment issues, EIB transport project appraisal 364
Enron collapse 261
enterprise resource planning (ERP) systems 154, 224, 225–6
environmental issues see sustainability issues
environmental separation index (ESI) 43
EPCglobal standards system 217
EPOS (electronic point of sale) 69
ERP (enterprise resource planning) 154, 224, 225–6
ESI (environmental separation index) 43
ethical issues 160
  corporate social responsibility (CSR) 43, 333
  ethical sourcing 159–60
  ethnocentricity 28
European Investment Bank (EIB) transport project appraisal 358–69
ex-works costing 234
expertise of professionals 311, 312
exports 21–2
  contamination in 347–50
  and import refusals 350–2
external integration 46
extraterrestrial supply chains 370–1
factory gate pricing (FGP) 106–10
fake medicines 338–45
fashion industry, containers 112
FCL (full container loads) 110
FDI (foreign direct investment) flows 28–9
FedEx 6, 136
FGP (factory gate pricing) 106–10
finance flows 220–1
costing approaches 231–4
financial appraisal, European Investment Bank 361–4
financial scandals 261
financial value added, European Investment Bank 368–9
Fisher, M. 67–8
flexi tank containers 112
FloraHolland 215–16
food miles 162, 279
foot and mouth disease 259–60
Ford 37, 61
forecasting 226–7, 297
management science 327
foreign direct investment (FDI) flows 28–9
Forrester, J. 4, 74, 260
Forrester effect 74
forward cover 169
fourth party logistics (4PL) 137
freight
air cargo case study 244–8
containerisation 6, 23–4, 110–13, 282
costing 234
cross-docking of 193–4
deregulation of transport 5–6
directional imbalances 29–31
equipment for handling 196–7
growth in, and economic growth 281
Jaguar Land Rover case study 93–6
logistics service providers 131–9
Melbourne case study 249–52
picking solutions 199–201
reduced transport sensitivity of 4–5
RFID technology 210–16
security measures 260
vs services 310
storage 198–9
terminology 7–8
touchpoints 110
transport of 103–15
freight forwarders 132–3
freight tonne kilometres (FTKs) 106
fuel protests 259–60
full container loads (FCL) 110
full life costs 232
fuzzy analytic hierarchy process (F-AHP) 367–8
gain share 233
game theory 47
gaming 74
Gate Gourmet 270–1
Gattorna, J. 68, 72, 137, 183, 330, 334
General Electric (GE) 307
generalised costs 139, 232–3
geocentricity 28
Global Data Synchronisation Network (GDSN) 217
global logistics performance index (LPI) 24–5
global perspective 15
globalisation 26–9
impact on manufacturing 35–6
glocalisation 27
good distribution practice (GDP) 339–41
good manufacturing practice (GMP) 339, 340
goods-to-picker solutions 200
green products, customer demand for 299–300
‘green revolution’ 277–81
greenhouse gas (GHG) emissions 278
groupage 113, 133
GS1, global standards organisation 217
hauliers 132, 281
healthcare sector 14
inefficiency of waiting 62
inventory management 311–12
triage 14–15
hierarchy of recovery options 293–4
holding costs, inventory 171
holistic approaches, risk management 265–6
holistic view of logistics and SCM strategy 59
Holweg, M. 73
horizontal collaboration 48, 49, 50
Houlihan effect 74
hub and spoke model 136, 283
humanitarian logistics 49, 50, 81–2
business–humanitarian partnerships 84–6
problems encountered in practice 82–4
role of human resources in 85
hybrid strategy 69
IBM 307
Ikea 14, 283
import refusals case study 347–53
in-transit inventory 179–80
incoterms 235–6
independent demand 225
India 35, 36, 38, 55, 156, 307
information, visibility of 222–3
information flows 220, 221–4
  performance management 229–31
  supply chain planning and control 224–9
  trade facilitation 235–6
information sharing 46, 47, 154, 311
information technology
  additive manufacturing 217–8
  disaster recovery 262
  electronic data interchange 210
  enabling supply chain integration 45–6
  Internet of everything 209, 222
  maker movement 218
  millennium bug 258–9
  procurement systems 154–5
  RFID technologies 210–16, 268–9
  standards for data 217
  supply chain planning and control 224–9
  and transport security 125–9
infrastructure dependencies 267–9
integration
  and reverse logistics 301
  of supply chains 45–6
integrators 133
intermodal transport 110
internal integration 46
international commercial terms
  (incoterms) 235–6
International Maritime Organization (IMO),
  security initiative 120–2
International Ship and Port Facility Security
  (ISPS) Code 120–2
International Standards Organisation,
  ISO 28000, supply chain security 124–5
international trade
  directional imbalances 29–31
  and globalisation 26–9
  growth in 21–2, 35–6
  logistics performance measurement 24–6
international transport networks 114
‘international’ vs ‘global’ 15
Internet of everything (IoE) 209, 212
intersectionist view 13
inventory 168
  centralisation of 177–8
  control systems 174–6
  costs associated with 170–3, 179–80
  flow types 183–4
  reasons for holding 169–70
inventory management 167–70
  ABC analysis tool 191–3
  economic order quantity (EOQ) model 170–3
  in hospitals 311–12
  inventory control systems 174–6
  inventory flow types 183–4
  and risk management 266–7
  in the supply chain 176–80
inventory reduction 6–7
  by centralisation 177–8
  delayed product differentiation 178
  just-in-time (JIT) system 185
  and part commonality 178
  by pooling 184
  principles of 184–5
iPhone, Apple 309–11
ISO 28000, supply chain security 124–5
ISPS Code, transport security 120–2
Italian outsourcee case study 55
Jaguar Land Rover case study 89–99
Japan
  keiretsu supply chain structure 46
  lean production 61–3
  trading relations with Australia 347, 348, 349–50, 352–3
job design 202–5
John Lewis Partnership case study 239–43
Jones, D. 63–4
just-in-time (JIT) inventory system 62, 185, 284
keiretsu supply chain structure 46
key performance indicators (KPIs) 229–31
  driving forces behind 229
‘knowable unknowns’ 258, 259, 261
knowledge management
  expertise of professionals 311, 312
  knowledge areas for SCM 335
‘known unknowns’ 258
Kraljik matrix 147–9, 151
Kuehne + Nagel, logistics company 137
landed costs 233–4
landfill usage cost 292
layout of warehouses 192–5
LCL (less than full container load) 110
lead time
  definition 171
  reduction 184–5
Index

leagile supply chain 69–70
lean consumption 63–4
lean production and logistics 61–4
  combining with agile 67–70
Lee, H. 72
legislation
  environmental 194, 289, 292, 299
  financial accounting 261
  pharmaceutical distribution 344
  reverse logistics 291–2, 299
  transport security 117
Lehman Brothers, collapse of 261
less than full container loads (LCL) 110
Levitt, T. 27
Liner Shipping Bilateral Connectivity Index (LSBCI) 26
liner shipping connectivity index (LSCI) 25–6
liquor DC, Australia 203
livestock diseases, impact of 259, 260
local sourcing 280, 287
localisation costs 234
locker box logistics 201
logistics 8–10
  applications of 13–15
  evolution of 4–8
  management science applications 320, 321
  megatrends 332
  role in national economies 8
  vs SCM 12–13
see also reverse logistics
Logistics Emergency Team (LET) 85–6
logistics service providers (LSPs) 131–4
  fourth party logistics (4PL) 137
  Jaguar Land Rover case study 97
  responsibilities of carriers 138
  selection of 138–9
see also 3PLs
long-range acoustic device (LRAD) 118–19
low-cost country sourcing 156–7
macro-environment 271–2
Maersk Alabama (hijack of) 119
make-to-order (MTO) 62
make-to-stock (MTS) 62
maker movement 218
Malaysia 307
management information systems 195
management science (MS) 317
  applications 320, 321
  decision making and forecasting 326–7
optimisation 320–5
simulation 325
system characteristics 318–20
management skills 333–5, 337
managerial tendencies 263–4
manufacturing
  additive 217–18
  Dell’s strategy 77–9
  globalisation of 35–6
  Jaguar Land Rover case study 90–2
  lean production 61–4
  mass customisation 64–7
  mass production 61
  remanufacturing 293, 294, 295–9
  vs service supply chains 309–12
  traditional vs recoverable 297
manufacturing resource planning (MRP II) 226
maritime transport 6, 106
  piracy as threat to 118–20
  security initiatives 120–4
Marks & Spencer 212
mass customisation 64–7, 77–9
master production schedule (MPS) 225
material substitution 5
materials (inventory) 168
materials handling equipment (MHE)
  196–7, 202
materials requirements planning (MRP)
  224, 225–6
Mattel 157
McKinnon, A. 281
McLean, M. 6
measurement see performance measurement
medical devices case study 80
medical triage 14–15
medicines, counterfeit 338–45
Melbourne, Australia 249–52
metrics see performance measurement
MHE (materials handling equipment)
  196–7, 202
military logistics 9, 258
millennium bug 258–9
Moller-Maersk Group 137, 282–3
motivation
  of buyers and sellers 143–4
  employee 204
  for reverse logistics 290–2
MPS (master production schedule) 225
MRP (materials requirements planning)
  224, 225–6
MRPII (manufacturing resource planning) 226
multi-criteria decision analysis (MCDA), EIB transport project appraisal 366–8
multinational companies (MNCs) 28, 35 and procurement 146

national distribution centres (NDCs) 107
national emergency planning and creeping crises 259–60
natural disasters 271
and humanitarian supply chains 81–6
NDCs (national distribution centres) 107 nearshoring 40
networks 12
and factory gate pricing 109–10
Global Data Synchronisation Network (GDSN) 217
hub and spoke 136, 283
and information flows 221
international transport 114
inter-organisational 269–71
Melbourne 250–2
and procurement 163
reverse logistics 294–6, 299
of warehouses 190
Nigeria, public procurement regulations 146
non-vessel-owning common carrier (NVOCC) 133

objective risk 264–5
OEMs (original equipment manufacturers) 38
offshoring 35, 36, 39–40
open book costing 233
operational risk 261
operations research (OR) see management science
opportunity costs 171, 232
optimisation techniques, management science 320–5
order batching 74
order-losing sensitive qualifiers 43
order picking 199–201, 241–2
order qualifiers 37, 42–3
order winners 37, 44
original equipment manufacturers (OEMs) 38
outsourcing 36–8, 137
to Asia 35, 55
evaluating outsourcers 41–4
failures in 40–1
of inventory management 228

legislation 261
relationships 44–5
and risk management 269, 270
of transportation 132
see also 3PLs
own-account transportation 132

packaging
costs 234
Jaguar Land Rover case study 98
pallets
dimensions 197
storage 198–9
Pangea 338–9
Pareto, V. 181
Pareto rule 181
part commonality 178–9
Penn Purchasing Services, top-down procurement approach 158–9
perceived risk 264–5
performance measurement 229–31
choosing appropriate metrics 230–1
driving forces for 229
logistics 24–6
for procurement 157–9
reverse logistics 301–2
periodic inventory control system 174–6
pharmaceutical supply chains 338–45
picking solutions 199–201
pipeline transport 105
piracy 118–20
polycentricity 28
port-centric logistics 284, 285
Port Facility Security Assessment (PFSA) 121
Port Facility Security Plan (PFSP) 122
port logistics city, Melbourne as a 249–52
port security 120–4, 127
Porter, M. 60
portfolios of spend, managing 147–9
postponement 64–5, 69, 78, 178, 191
PPV (purchase price variance) 157–8
price/pricing 5, 155–6
factory gate pricing 106–10
price variation 74
transfer pricing 22
principle of postponement 64–5, 69, 78, 178, 191
prisoner’s dilemma, game theory 47
probability 264–5
process engineering 266–7
procurement 142–66
  costs 170
  ethical sourcing 159–60
  and markets 146–7
  organisation 152–4
  performance 157–9
  private vs public sector 144–6
  process/lifecycle 152–7
  risk management 147–51
  role of the buyer 151–2
  and supply chain management 162–3
  sustainability 160–2
  techniques and tools 152
product design
  involvement of supply chains 354–7
  synchronising with supply chain design 332–3
productivity improvements 6
public–private partnerships (PPPs) 368–9
pull philosophy 62, 63
purchase price variance (PPV) 157–8
push philosophy 62, 63, 225
pushback racking 198
Quinn, F. 72, 334
radio frequency identification (RFID)
  126, 210–16
  benefits & limitations 214
  biometric security systems 126
  FloraHolland case study 215–16
  global standards for 217
  military consignments 268–9
rail transport 105
  cost calculations 180
rationing 74
RDCs (regional distribution centres) 107
re-labelling view 13
recovery options 292–6
recycling 293–6
reefer containers 112
regional distribution centres (RDCs) 107
regional trade agreements 21
regression models 327
regulations
  environmental 293, 299
  financial 261
  procurement 144–6
  see also legislation
relationship strategies 162–3
reliability, management science models 319
remanufacturing 293, 294, 295
  characteristics of 295–9
reorder point (ROP) 170–1
  inventory control system 174
replenishment 192
reshoring 40
resilience 257
  proactive measures to improve 259
resource reduction 293–4
resource utilisation, reverse logistics 301
resources, flow of 11
reuse 292, 294, 295–6
revenue passenger kilometres (RPKs) 106
reverse logistics 194, 289–90
  motivations for 290–2
  performance measures 301–2
  recovery options 292–6
  remanufacturing 295–9
RFID see radio frequency identification
rightshoring 40
risk 256
  EIB transport project appraisal 365–6
  objective and perceived 264–5
risk management 261–2, 267
  and procurement 147–51
  shortcomings of 263–5
  and wicked problems 266–72
Rittel, H.W.J. 266
road transport 281
  improving efficiency of 284
robust SCM 71, 257
Roos, D. 63
Rumsfeld, D. 258
safety stock 171, 176
sales, Jaguar Land Rover case study 92–3
Sarbanes–Oxley Act 2002 (SOX) 261
satisficing decision-making behaviour 326
scale, role of 282–3
scenario building 327
Seabourn Spirit (cruise ship) 118–19
security
  post 9/11 attacks 260
  transport 117–29
Semi-Automated National Distribution Centre (SANDC) 240–3
service, definition of 308
service innovation 308–9, 315–16
service level agreements (SLAs) 36–7, 231
service science 308–9
service sector 306–9
    lean thinking applied to 63–4
    logistics applied to 14–15
    transition to service economies 306–8
service supply chains 306
    vs manufacturing 309–12
models 313–14
services, characteristics of 310
erservitisation 307–8
shipping sector
    containers 6, 23–4, 111–12, 282
    costs 282, 283
    directional imbalances 29–31
    import refusals 347–53
    Moller-Maersk Group 137, 282–3
    performance measures 25–6
    piracy problem 118–20
    security initiatives 120–4
silos 59, 71
simulation, management science 325
Sirius Star (hijack of) 119
SLAs (service level agreements) 36–7, 231
social networking 163
socio-technical systems (STS) theory 202
sourcing strategies 146–7
    ethical sourcing 159–60
    and food miles 162
    local sourcing 280, 287
    low-cost country sourcing 156–7
SOX (Sarbanes–Oxley Act 2002) 261
space industry 370–1
square root rule 178
standard cost 157
standardisation 65, 78–9
standards
    for data 217
    for security 124–5
static models 318
stochastic models 318
stock classification systems 181–3
stock-keeping units (SKUs) 66–7
storage
    John Lewis warehouse 241
    non-pallet storage 199
    pallet storage 198–9
    and picking 201
strategies 57–60, 224–9
    agile supply chains 64–7
    ‘bullwhip effect’ 74
combining lean and agile 67–70
    guidelines for managers 71–3
    lean production 61–4
    manufacturing 61
    mass customisation 64–7
    sourcing 146–7
‘stuffing plans’ 112
substandard medicines 342–3
supplier development 37, 51, 53
supplier motivation 143–4
suppliers, Jaguar Land Rover case study 92
supply base rationalisation 50
supply chain collaboration 47–53
supply chain integration 45–6
supply chain inventory management 176–80
supply chain management (SCM) 10–12
    7 principles of 70–1
    applications of 13–15
    evolution of 4–8
    vs logistics 12–13
    management science applications 320, 321
megatrends 332
    strategies and practices 330–1
supply chain planning see strategies
supply chain relationships 34–5
    collaboration 47–53
    integration 45–6
    and international trade 35–6
offshoring 39–40
    see also outsourcing
supply chain shocks, sources of 262
supply chain transparency 15
SupplyAero Holdings Ltd 51–3
sustainability issues 276
    efficiency solutions 283–6
    EIB transport project appraisal 364
    green issues 277–9
    in procurement activity 156, 160–2
    and reverse logistics 300
    role of scale 282–3
    and supply chain redesign 279–81
systems thinking 319
‘T-shaped’ skills profile, logistics
    managers 334
take-back programmes 291–2
Tang, C. 71, 257
tare weights, containers 112
TechCo case study 355–7
technology 208–9
   additive manufacturing 217–18
   advances in medical 14
   automation 209–10
   data capture and transfer 210–16
   global standards 217
   improving productivity 6
   Internet of everything 209, 222
   maker movement 218
   socio-technical systems theory 202
   training, importance of 268–9
   transport security 125–9
   see also information technology
   terminal handling charges (THCs) 233
   terrorism, security concerns 117, 118, 122, 260
   TEU (twenty-foot-equivalent) 112
   Texas Pacific Group (TPG) 270–1
   THCs (terminal handling charges) 233
   third-party logistics companies see 3PLs
   through life costs 232
   tiers of suppliers 38
   total cost of outsourcing 44
   total costs of ownership 232
   Toyota Production System (TPS) 61–3
   traceability technologies 210–16
   trade see international trade
   trade facilitation 235–6
   traditionalist view 13
   training, importance of 268–9
   transactional costing 233
   transfer pricing 22
   transit inventory 179–80
   transloading 112–13
   Melbourne case study 251
   transnational corporations (TNCs) 28–9
   transport 103–4
   deregulation of 5–6
   different modes of 103–6
   efficiency of 113–14
   EIB transport project appraisal 358–69
   and factory gate pricing (FGP) 106–10
   fuel use 284–5
   generalised costs 232–3
   growth of, link to economic growth 281–2
   international networks 114
   Jaguar Land Rover case study 93–7
   lean thinking 62
   load devices 110–13
   management science applications 320–5
   optimisation techniques 320–5
   security initiatives 120–5
   transport cost sensitivity 5
   transportation model 108, 118–21, 322–5
   triage 14–15
   triple bottom line 161
   twenty-foot-equivalent (TEU) 112
   UASs (unmanned aerial systems) 128–9
   uncertainty 258
   reason for inventory 169
   in a remanufacturing environment 298
   vs risk 264
   unionist view 13
   University of Pennsylvania Purchasing Services 158–9
   ‘unknowable unknowns’ 258, 260
   unmanned aerial systems (UASs) 128–9
   upstream 10–11
   validity, management science models 318–19
   value, managing 147–51
   value-added recovery 293, 294, 295
   value-added services 307, 308
   European Investment Bank 368–9
   value-adding activities, warehouses 191–2
   value chains vs supply chains 60
   value for money (VfM) 122, 155, 156, 157
   variation
      in demand 65, 177–8
      price 74
      reduction of 184
      and safety stock 176
   vendor-managed inventory (VMI) 228–9
   vertical collaboration 48, 49
   vertical integration 7
   virtual organisations 37
   VMI (vendor-managed inventory) 228–9
   volumetric charging 104
   Volvo Trucks India 36
   VUCA 263
   vulnerability of supply chains 256–7
   Wal-Mart 8
   Walters, D.W. 183
   warehouse management systems (WMS) 195–6
      data capture and transmission technologies 197
   John Lewis case study 243
warehousing 189–92
  costs 234
  layout and design 192–5
  workforce issues 202–5
  see also warehouse management systems
waste
  disposal costs 292
  electronic see e-waste
  legislation 291–2
  recycling of 293–6
Waste Electrical and Electronic Equipment
  (WEEE) Directive 194, 291
waterways 105
wave picking 200
Webber, M.M. 266
whole lifecycle costs, procurement 155–6
wicked problems 266
  simple framework for 266–72
wine industry, containers 112
Womack, D. 63–4
work organisation 202–5
World Bank, logistics performance tool
  24–5
Y2K, millennium bug 258–9
Zara 69, 70
zone picking 200