Index

Note: Page numbers followed by “n” with numbers indicate footnotes.

Absolute frequencies, 38
AccountAbility 1000 (AA 1000), 278–279
Actions, 179
  plan development, 71–72
Affinity diagram (see KJ technique)
Alternative hypothesis, 49
American Productivity and Quality Center (APQC), 104
Analysis of variance (ANOVA), 161, 163–164
Analytic hierarchy process (AHP), 87
Analytical benchmarking, 103–104
Andon systems, 147
Antecedents, 203–207
Antecedents–process–consequences framework, 203
Approval and publication, 191
Artificial performance optimization, 167
Audit(s), 191
  certification, 240
  criteria, 256
  external, 191
  initial, 240
  internal, 191, 238
  preliminary, 240
  second-party, 191
  surveillance, 240
  third-party, 191
Autonomation, 147–148
Balanced scorecard (BSC), 55–56
  communication and connection, 63–66
  incentive schemes, 66
  measurement perspectives, 56–62
  overcoming design issues, 73–74
  overcoming implementation problems, 74–75
  overcoming usage issues, 75–76
  personal, 66
  performance management through, 66–73
  strategy map, 62–63
  success, 73–76
  theoretical bases, 55–57
Balanced standards, 190
Basic attributes (B), 86
Benchmarking, 91
analytical, 103–104
approaches, 95–98
characteristics, 94–95
methodology for
implementation, 100–106
object, 98–100
origins and evolution, 92–94
PDCA cycle, 104–106
synthetic, 100–103
Bernoulli random variable, 42
Best practices, 103
benchmarking, 95
Binomial distribution, 43
Black belt (role), 155
“Black box” process, 176
Box and whiskers plot (Boxplot), 39–40
British Standard Institution, 16,
187, 200, 246
BS 5750 standards, 187
BS 7799–2: 1998 “Information
security management
system–Specifications”
standard, 246
Bureau Technique (BT), 190
Business
evaluation systems, 57
excellence models, 17–18
objectives, 171
processes, 209–210
strategy in daily operations, 71
Business Process Management
Software, 181
Business process reengineering
tools (BPR tools), 98
Business-to-business (B2B), 10
Buyer’s risk (see Consumer risk)
“Catch-up growth” process, 9
Causal relationships, identification
of, 67–70
Cause–effect diagrams, 160
Certification (see also International
Organization for
Standardization (ISO))
audit, 240
body, 239
OHSMS, 239–241
process, 191–193, 204
Champion (role), 154–155
Chemical sector, 212
Chi-square distribution, 45
Child labor, 266–267
China Social Compliance 9000
for Textile and Apparel
Industry (CSC9000T), 279
“Classic” statistics-based quality, 18
Coercive power, 29–30
“Cogent” documentation, 195
Coherence, high strategic, 211
Collective bargaining, right to,
268–269
Communication, 74
of BCS, 63–66
for ISMS, 254
of objectives and measures, 64
SA 8000 standard, 275–277
systematic, 208–209
Competitive benchmarking, 93, 96
Comprehensive benchmarking
project, 95
Compulsory certificate, 188
Confidence intervals, 47–48
Consumer risk, 50
Context, 221
of organization, 218, 249–250
Continuous distribution, 43
Continuous process improvement
(CPI), 131
Control limits, 51–52
Corporate image and reputation, 210
Corporate social responsibility
(CSR), 18, 265
standards/codes of conduct, 278–279
Correlation
analysis, 241
coefficient, 41
matrix, 41, 81, 88–89
Cost, 164
of certification, 205
Council on Economic Priorities
Accreditation Agency, 265
Critical components
characteristics, 79
Critical product requirements, 79
Critical to quality (CTQ), 158
Criticality, 30
Customer, 31, 194
perspective, ISO 14001, 210–211
perspective of BSC, 59–60
Customer requirements, 79–80, 87
identification, 81–83
Customer satisfaction, 109
analyses, 109
analysis of results, 115
data collection, 113–114
planning of methodological
aspects, 111–113
preliminary analysis, 110–111
SERVQUAL method, 115–116

“Dantotsu”, 91
Data
envelopment analysis, 209
sources and analysis level of
benchmarking, 97–98
Data collection, 113–114
methodology, 112
sheet, 161–162
Defect-free products, 12
Define, measure, analyze,
improve, control
methodology (DMAIC
methodology), 155–165
Degrees of freedom, 45
Demanded quality chart, 82
Deming cycle, 104, 106, 220–221, 239
Deming Prize, 11, 14
Democracy, 188
Density function, 46
Dependent variable, 50
Deployment of expected quality,
84–87
Descriptive statistics, 35–36
graphical representations, 38–41
summary statistics, 36–38
Design for six sigma (DFSS), 155
Design of Experiment (DOE), 161,
163–164
Detection (D), 119, 121
from customer’s point of view, 122
Development teams, 170, 174
Disciplinary procedures, 269–270
Discrete probability distributions, 42
Dispersion
diagram, 40
indexes, 37
Documentation, 195
document writing, 190
documented information, 254
Economic development of
headquarters’ region, 206
Economic lot of production,
142–143
80/20 rule (see Pareto principle)
Electrification, 6
Employees, 24–25, 28, 31
designated, 7
involvement of, 211
SA 8000 representative, 272
“EN” standards, 190
“END” standards, 190
Engineering characteristics, 80, 83
Environmental legal requirements, 204
Environmental Management System (EMS), 199–200, 212
Ergonomics, 132
Estimation error, 47–48
European Committee for Standardization, 189–190
European Foundation for Quality Management, 15
European standard (EN), 188
Event Tree Analysis, 10
Evidence-based decision-making, 195
Excitement attributes (E), 86
Expected value for continuous variable, 42
Explanatory variables, 50
Exponential distribution, 45
External audits, 191

Failure mode and effect analysis (FMEA), 10, 117–118, 164
advantages and problems in, 125–127
construction, 123–125
risk perception and RPN, 118–122
Fault detection analysis, 122
Fault effect analysis, 120
Fault Tree Analysis (FTA), 10
Financial indicators, 55, 59

Financial perspective of BSC, 59
ISO 14001 certification, 210
First Industrial Revolution, 6
Fishbone diagrams (see Cause–effect diagrams)
Fisher distribution, 45
Five gap model (see SERVQUAL method)
Five Ws and one H method (see Six Ws method)
FLA Workplace Code, 279–280
Flow chart representation, 178–179
FMEA Team Start-Up Worksheet, 123
 Forced labor, 267
Formal (ineffective) implementation of ISO 14001, 205
Freedom of association, 268–269
Frequency
absolute, 38
density, 38
distribution, 38
relative, 38–39
Functional benchmarking, 96
Functions (departments), 167–168
Gamma distribution, 45
Gap model, 109
Gaussian distribution, 43
Generic benchmarking, 96
Global benchmarking, 93–94
Global Compact (GC), 278–279
Global Reporting Initiative (GRI), 278–279
Government procurement standards, 16
Graphical form, 178
Graphical representation, 178–179
Green belt (role), 155

Hazards, 223, 225
Health and safety, 268
Heijunka (see Production leveling)
Hierarchical cluster analysis, 82
High Level Structure (HLS), 246–247
Histogram, 38–39
Historical series, 53–54
House of Quality (HoQ), 79–81
attributes, 84–87
compiling correlation matrix, 88–89
compiling relationship matrix, 83–84
customer requirement identification, 81–83
deployment of expected quality, 84–87
for design of folding chair, 82
engineering characteristics identification, 83
technical comparison, 88
Human capital, 61
Human factor, 225
Human resources, 196
Hypothesis testing, 163–164
verification, 48–50
If–then type function, 62
Independent scoring method, 88
Independent variables, 50
Indicator(s), 181
building, 183–184
choice, 183
development and maintenance, 185–186
implementation of indicator system, 185
representation, 184
Indifferent attributes (I), 87
Industrialization, 4–5
Industry rivals, implementation timing relative to, 212
Inferential statistics, 35, 45
Information, 179
capital, 61
security policy, 251
Information Security Management System (ISMS), 245, 249
communication for, 254
measurements, 256
process scheme to set up, 261–262
Infrastructure resources, 196
Initial audit, 240
Intangible assets, 28
Integrated management system (IMS), 262–263, 278
Internal audits, 191, 241, 255–256
Internal benchmarking, 96
Internal business processes perspective of BSC, 60–61
International Declaration of Human Rights, 266
International Electrotechnical Commission (IEC), 189, 246
International Labour Organization Conventions (ILO Conventions), 266–267
International Organization for Standardization (ISO), 15, 187–188, 201, 218, 246
Interquartile range (IQR), 37
Investors, 31
Ishikawa diagrams (see Cause–effect diagrams)
ISO 14001 standard, 199, 278
antecedents, 203–207
consequences on performance, 209–212
EMS, 200
ISO 14001:2015 standard, 201–202
ISO 14001 certification process, 212–213
literature review, 202–203
process, 207–209
series, 200
ISO 26000 certification, 278–279
ISO 31000 “Risk Management” standard, 252
ISO 45001 standard, 217–218
Annex SL, 217–218
benefits of adopting OHSMS, 241–243
certification of OHSMS, 239–241
Deming cycle, 219
ISO 9000 standard, 196–198, 278
admitted exclusion, 196–197
areas of innovation, 195–197
background, 187
benefits from ISO 9000’s implementation, 197
bodies, 189–190
certification process, 191–193
documentation, 195
outsourcing, 197
process, 190–191
quality management principles, 194–195
readability and comprehension, 195–196
resources management, 196
and value, 187–189
ISO 9000:2015, 249
ISO/IEC 17021:2006 standard, 192
ISO/IEC 27000 standard, 248, 252, 255
ISO/IEC 27001 standard, 245–246
appendix A, 258–259
benefits of application, 259–260
certifications, 260
certainty of organization, 249–250
history, 246–248
improvement, 257
integrated management system, 262–263
leadership, 250–251
operation, 255
performance evaluation, 255–257
planning, 251–253
process scheme to set up ISMS, 261–262
scope, 249
structure, 248–259
support, 253–254
ISO/IEC 27002 standard, 247
ISO/IEC 27003 standard, 248
ISO/IEC 27004 standard, 248
ISO/IEC 27005 standard, 248
ISO/IEC 27006 standard, 247
ISO/IEC 27007 standard, 248
ISO/IEC 27009 standard, 247
ISO/IEC TR 27008 standard, 248
Japanese Union of Scientists and Engineers (JUSE), 11
Jidoka (see Autonomation)
Joint technical committee 1 (JTC 1), 246
Just-in-time (JIT), 130, 139–140
delivery of purchases, 146–147
economic lot of production and SMED, 142–143
line balancing, 142
production, 139–149
production cells and multiskilled workers, 143–145
production leveling, 140, 142
pull system and Kanban system, 145–146
relationship matrix between practices and, 141
Takt time, 140
workplace organization, 145

Kaizen (see Continuous process improvement (CPI))
Kanban system, 145–146
KJ technique, 82

Labor
child, 266–267
forced, 267

Leadership, 154, 194, 202

Lean
enterprise, 133–139
organizational model, 133
production, 129, 131, 134
supply chain, 130, 136
Lean management, 129–131
elements of Toyota’s production system, 139–149
lean enterprise, 133–139
origins and traits, 131–133

Lean Thinking (Womack and Jones), 130

Learning, 61–62, 94, 136
Least squares method, 51
Legitimacy of stakeholders, 29
Life cycle assessment (LCA), 202, 208
Lifetime distributions, 45
Line balancing, 142

Linear regression model, 50
Logical security, 245
Lower control limit (LCL), 51

Malcom Baldrige National Quality Award (1987), 14–15
Management review process, 236, 272
Management system, 243, 271–274
Mass production, 6, 129–130, 134
Master production schedule (MPS), 145
Mathematical model, 45
Measurement perspectives of BSC, 56, 58
customer perspective, 59–60
financial perspective, 59
indicators for business to business services company, 58
internal business processes perspective, 60–61
learning and growth perspective, 61–62
Median, 37
Memory of Meeting, 254
Mindset, 12, 129
Modus operandi, 12, 89, 117, 129, 133
Multiskilled workers, 143–145
Mutual consent, 188

National standard, 188
Natural variability, 51
Non-compliance, 257
“Non-fulfilment of requirement”, 257
Non-quality cost, 197
Normal distribution, 44–45, 47
Normative power, 29–30
North Atlantic Treaty Organization, 187
Null hypothesis, 49
Numerical variables, 38

Objective evaluation matrix, 171–172
Observed significance level, 50
Occupational health and safety (OHS), 217, 222–223
Occupational health and safety management system (OHSMS), 217–218
Annex, 221
benefits of adopting OHSMS and benefits of certification, 241–243
certification, 239–241
Deming cycle, 239
time example of objectives program, 229
time example of risk assessment criterion, 226–227
extract from internal audit checklist, 237
flow chart for fire emergency management, 235
internal audit program, 238
OHS performance, 228
organizational chart, 231
planning phase, 223
requirements and implementation, 220–239
safety policy, 224
scale of risk mitigation interventions, 225
SMART, 230
training program, 232
work permit, 233–234

Occurrence (O), 119–120
One-dimensional attributes (O), 86
Operational benchmarking, 95–96, 98
Operational controls, 201–202, 233
Operational tools, 174–176
Opportunities, 223, 228
Optimized process redefinition, 170
Organizations, 167
capital, 61
charts, 174\textit{n}3, 231
modeling, 171–173
security, 245
“Out of control” process, 52–53
Outcome measures, 71
Outliers, 37
Overall performance index, 183

\( p \)-value, 50
Pareto principle/diagram, 9, 38–39
Part/subsystem deployment matrix, 79
Partners, 28, 133, 136
Percentile, 37
Performance benchmarking, 95, 98–99
Performance drivers’ measures, 71
Performance indicators, 70–71
Performance management through BSC, 66
action plan development, 71–72
articulating company’s strategy, 67
identification of causal relationships, 67–70
performance indicators, 70–71
reporting system creation, 72–73
strategic objectives for “facility management office”, 68–69
PESTLE analysis, 221
Philosophy, process, people, partners, and problem solving model (4P model), 133–139
Physical security, 245
Plan-Do-Check-Act cycle (PDCA cycle), 9, 104–106, 194, 200, 219, 245
and methods, 208–209
Planning and implementation of SA 8000 standard, 272
Poisson distribution, 42
Poka-yoke, 135, 147
Polarization of perspectives, 17–18
Population, 36
Position indexes, 36–37
Practice benchmarking, 99
Preliminary audit, 240
Probability, 41
density of normal distribution, 44
distributions, 42–45
of failure analysis, 121
function, 42
plots, 47
Problem-solving process, 139
Process approach, 167, 170, 194, 278
obstacles and benefits of, 176–178
Process indicators, 181–183
building indicator, 183–184
choice of indicators, 183
example of matrix for identification, 182
implementation of indicator system, 185
representation of indicators, 184
Process mapping
development team and process owner, 174
methods, tools, languages, and rules, 179–181
operational tools and practical guidance, 174–176
organization modeling, 171–173
process identification, 169–170
processes, functions, and procedures, 167–168
and risk-based thinking, 181
textual and graphical representations, 178–179
benchmarking, 93
criticality matrix, 171, 173
identification, 169–170
managers, 170
owner, 174
planning matrix, 79
process/quality control matrix, 79
quality, 3, 12
and quality control parameters, 79
Producer risk, 50
Product
design matrix, 80
planning matrix, 79
quality, 2–3, 6
Production cells, 143–145
Production leveling, 140–142
Productivity, 7
Project development teams, 155
Public communication phase, 191
Pull system, 145–146
Push systems, 145
PYX4 software tool, 179–180
Qualigram method, 179
qualigram pyramid, 180
Qualitative variables, 36
Quality, 1–3
chart, 77, 82
gurus, 14
history, 4–5
of idea, 2, 6, 12
of impact, 3, 18
markets and approaches, 9–13
meanings, 4, 6, 10, 12, 18
planning, 84
principles, 181
standards, 187
strategy, 17
tables of QFD, 79
of technical realization, 2, 6, 8, 10
at time of industrial
revolution(s), 5–7
at turn of millennium, 17–18
Western Quality Movement, 14–17
after World War II, 7–9
Quality assurance (QA), 10
Quality control (QC), 8–9
charts, 51–53
Quality function deployment
(QFD), 77–78, 158
advantages and problems in application, 89–90
House of Quality (HoQ), 80–89
instrument features, 78–80
Quality inspection (QI), 5–7
Quality management, 23, 91, 129
principles, 194–195
and quality insurance, 189
Quality management system
(QMS), 176, 191, 192n2
Quantile, 37
Quartiles, 37
R software, 36, 38
Random experiment, 42
Random process (see Stochastic
process)
Random variable, 42
Range of variation, 37
Readability, 195–196
Regression, 50–51
Relationship, 175
digraph, 89
management, 195
matrix, 80, 83–84
Network diagram, 89
Relative frequency, 38–39
Relative-importance ranking, 87
Relevance theory of stakeholders, 29–31
Remuneration, 28, 270–271
Reporting system creation, 72–73
Resistance to change, 74
Resource management, 196
“Responsible Care” program, 200
Revealed Preference techniques, 87
Reverse attributes (R), 87
Reverse Engineering and product
competitive analysis, 93
Risk priority number (RPN), 118–122, 164
Risk(s), 218, 223
analysis, 252
assessment, 223, 226–227
management, 259
perception, 118–122
risk-based planning and
controls, 201
risk-based thinking approach, 181, 218
SA 8000 standard, 265–266
advantages and obstacles, 275–277
analysis with ISO 9001 and ISO 14001 certification, 278
and other CSR standards/codes of conduct, 278–279
structure, 266–274
Safety management system, 241
Safety policy, 224, 241
Sample, 36
selection, 111
size, 36
variance, 37, 47
Scatter plot, 41–42
Scorecards, 100–101
Second Industrial Revolution, 6
Second-party audits, 191
SERVQUAL method, 18, 115–116
Severity (S), 119–121
Shareholders, 24–25, 28
Shewhart charts, 51
Shojinka, 143–145
Situational factors, 103
Six sigma method, 18, 153
DMAIC methodology, 155–165
history, 154
supporting structure, 154–155
Six Ws method, 175
Small and medium enterprises (SMEs), 15
SMED system, 142–143
Social Accountability
International, 265
Social factor, 225
Social responsibility requirements of SA 8000 standard
child labor, 266–267
disciplinary procedures, 269–270
discrimination, 269
forced labor, 261
freedom of association and, 268–269
health and safety, 268
management system, 271–274
remuneration, 270–271
right to collective bargaining, 268–269
working hours, 270
Sort, straighten, shine, standardize and sustain method (5S method), 145
Specific, Measurable, Attainable, Relevant, Time-bound (SMART), 230
Stakeholders, 23, 26–29, 194
companies and, 24–25
engagement, 274
involvement, 211
legitimacy of, 29–30
power of, 29–3
principles of stakeholder management, 31–33
relevance, 29–31
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Standard(s) (see also International Organization for Standardization (ISO))
Statistical inference techniques, 46
confidence intervals, 47–48
hypothesis verification, 48–50
regression, 50–51
Statistical process control (SPC), 8
Statistical test, 49
Statistical tools, 35, 163
advanced techniques, 51–54
descriptive statistics, 36–41
inferential statistics, 45
probability, 41–45
Statistical units, 36
Statistics, 36
Stochastic control, 53–54
Stochastic process, 53–54
Strategic/strategy, 171
  benchmarking, 93
deployment, 71
learning, 72
  map, 56, 59, 62–63, 69–70
proactivity, 206
Structured process, 91
Student’s t distribution, 45
Subcontractors control, 272–273
Substitute quality characteristics, 83
Subsuppliers control, 272–273
Summary statistics, 36–38
Suppliers, 28
  control, 275–276
Suppliers, Input, Process, Output,
  and Customers scheme (SIPOC scheme), 159–160
Supply chain, 81, 204
Surveillance
  audit, 240
  visits, 192
Synthetic benchmarking, 100–103
System approach, 278
System boundaries, 170
Systematic communication with
  stakeholders, 208–209
Systematic variability, 51

Takt time (Tt), 140
Tangible assets, 28
Targets, 64–66
customer satisfaction value, 87
values, 183
Team-based approach, 208
Technical Committee Management
  Board, 190
Technical Committees (TC), 189
Technical Management Board (TMB), 189–190
Technical rules, 188
Technical standards, 188
Test statistics, 49
Textual representation, 178–179
Third-party audits, 191
Time
  schedule, 113
  sensitivity, 30
series (see Historical series)
Top management, 133, 140,
  207–208
  commitment, 211
Top-down approach, 169–170
Total Productive Maintenance (TPM), 148–149
Total quality control (TQC), 11–12,
  14
Total quality management (TQM), 14–15, 208
Toyota way, 133
Toyota’s production system
  elements, 139
  autonomination, 147–148
  JIT, 139–147
  Toyota partnership model,
    136–137
  TPM, 148–149
Trade-offs, 81, 8389
Training program, 232
Transparency, 188
Tree of customer’s satisfaction, 114
Type I error, 50
Type II error, 50
UN International Convention on Rights of Child, 266
Universality, 101
Universe (see Population)
Upper control limit (UCL), 51
Urgency of stakeholders, 30–31
US companies, 10–11, 13, 92
US Military Specification (MILQ-9858), 187
US Technical Advisory Group, 201
Utilitarian power, 29–30

Value creation model, 24
Variability, 51
Variance for continuous variable, 42
Vision 2000, 194–195
Voice of customer, 83
Voice of engineer, 83
Voluntary certificate, 188

Weibull distribution, 45
Western Quality Movement, 14–17
Work environment resources, 196
Work in progress (WIP), 132
Workplace organization, 145