

# Index

- Abstract model, 91
- Accountants, 147–149
- Accounting, 147
  - engineer, 146
  - expected effects of Industry 4.0 on, 146–151
  - Industry 4.0 in enterprises, 142–145
  - progress of industry, 140–142
  - smart robots, 139–140
  - transactions, 148–149
- Achiever, 185
- Additive manufacturing systems, 75
- Adjustable robots, 87
- Advanced robotics, 70
- Agile firms
  - agility and organizational agility, 217–224
  - components of Industry 4.0, 212–215
  - generation industrial systems, 210–211
  - Industry 4.0, 211–212, 215, 224–226
- Agile leadership, 182–184
  - antecedents of, 55
  - collaboration, 53
  - competency, 53
  - drivers, 55–58
  - female leaders in perspective of, 129–130
  - and female managers, 131–132
  - flexibility, 52
  - individual factors affecting, 60
  - individual outcomes of, 62
  - organizational factors affecting, 58–60
  - organizational outcomes, 61–62
  - outcomes of, 60
  - place in OA, 186–187
  - quickness, 52
  - and sub-dimensions, 49–52
  - technology tracking, 53–54
  - theory, 49
- Agile Wheel Reference Model (AWRM), 220
  - components of organizational agility model and, 220–224
- Agility, 48–49
  - components of organizational agility model and AWRM, 220–224
  - OA and agile firms, 217–220
  - OA dimensions model, 220
  - and organizational agility, 217 types, 217
- Allied Consultants European (ACE), 180
- Amoeba organization, 160–161
- Android, 108
- Artificial fish swarm algorithm, 163
- Artificial intelligence (AI), 73–74, 83, 86, 102, 104, 106–109, 141, 148, 150
  - industrial, 112
  - in Industry 4.0, 146
  - learning models, 109–111
- Artificial neural networks, 73, 110–111
  - organization, 161
- Asian, women leadership in
  - cross-loadings in Malaysia, 284
  - cross-loadings in Thailand, 283
  - data analysis and findings, 270–274
  - data screening in Malaysia, 282
  - data screening in Thailand, 281

- emotional intelligence, 263–267
- learning autonomy, 260–261, 263–265
- literature review, 261
- organization culture, 268–269
- political differences, 267
- research methodology, 270
- women leaders, 262–263
- Auditing, 147
- Augmented reality, 74, 83, 87
- Autocratic leadership, 124
- Automatic feature learning, 111
- Automation, 73, 77–78
- Autonomous robots, 74, 83, 102, 215
- Autonomous systems, 212
- Average variance extracted (AVE), 245, 270
  
- Bartlett’s globality test, 309, 313
- Behavioral leadership theory, 4
- Behavioral theories, 4–5, 123
- Big Data, 74, 82, 87, 88, 213, 235
- Big Five Personality, 266
- Bilim, Sanayi ve Teknoloji Bakanlığı (BSTB), 73, 75
- Biomimesis, 157
- “Biomimetics”, 158
- Biomimicry, 156–158
  - application and samples in business enterprises, 158–164
  - Change, 155–156
- “Bionics”, 157
- Block chain technologies, 148
- Bombe, 108
- Boston Consulting Group (BCG), 79, 215
- “Bucket brigades”, 162
- Bumblebees, 159
  - organization model in, 159–160
- Bureaucratic leadership, 127–128
- Business, 33–34
  - environment, 174
  - executives, 2
  - Industry 4.0, competitive advantage and, 242–243
  - management, 145
  - and organization’s performance, 243–244
  - processes, 112
  - sustainability, 240–241
- Business enterprises
  - Amoeba organization, 160–161
  - application and samples of biomimicry in, 158
  - artificial neural network organization, 161
  - biomimicry, 158–159
  - fish swarm organization, 163
  - organization model in bumblebees, 159–160
  - süper organic organization models inspired by Termites, 163–164
  - swarm intelligence organization, 161–163
- Business-oriented leadership, 5
  
- Catalyst, 185
- Change in human, 29, 155
- Charisma, 9, 262
- Charismatic leadership theory, 123
- Chi-square value, 310
- Chief Executive Officer (CEO), 125
- Classic theory of management (CTM), 268
- Cloud Based Manufacturing (CBM), 213, 215
- Cloud computing, 74, 83, 87, 210, 289
- Cloud systems, 213
- Co-Creator, 185
- Coach-style leadership, 126–127
- Cognitive abilities, 145
- Collaboration, 53
- Communication
  - networks, 87
  - tools, 26, 196
- Competence, 16, 219–220
- Competency, 53, 178, 265–266
- Competition in health sector, 56
- Competitive advantage, 304–309
  - variables, 314–318

- Competitive strategy, 304–305
- Composite reliability (CR), 245, 270, 295
- Computer capital, 89
- Computer revolution (*see* Third Industrial Revolution)
- Confirmatory factor analysis, 309, 316
- Consistency, 184
- Contemporary digital Taylorism, 114
- Context-setting agility, 15, 185–186
- Contingency theories, 5–6, 123
- Contingent reward, 126
- Continuous learning, 224
- Convergent validity, 295
- Cooperative Practices, 180
- Creative agility, 15, 186
- Creative Destruction, 114–115
- Cronbach alpha coefficients, 309
- Customer agility, 217
- Customer Relationship Management (CRM), 36
- Customer satisfaction, 269
- Cyber twin, 105
- Cyber-Physical Systems (CPS), 70, 74, 83, 87, 102, 105, 141, 149, 203, 210, 213–214, 289
- Cybersecurity technologies, 74, 102
- Dartmouth conference, 109
- Decentralization, 142
- Decision making, 145
- Deep learning, 110
- Degree of freedom (df), 313
- Delegating style of leadership, 237
- Democratic leaders, 236
- Democratic leadership, 123–124
- Digital age learning culture, 10
- Digital citizenship, 11
- Digital culture, 2
- Digital Ledger Technology, 148
- Digital marketing (*see also* Electronic commerce (E-commerce)), 26, 32  
     comparison of traditional marketing and, 34–35  
     in E-commerce, 32–34  
     media and techniques in, 35–41
- Digital revolution, 10, 86, 202
- Digital Taylorism, 104, 112–114  
     AI, 106–109  
     AI learning models, 109–111  
     industrial AI, 112  
     industrial IoT, 106  
     Industry 4.0, 103–106  
     IoT, 106
- Digital technologies, 26, 76–77, 86, 196
- Digital transformation, 32, 78–79, 88, 93, 143
- Digital twin, 105
- Digitalization, 32–41, 76–77, 86, 92, 140, 143, 150, 210
- Direct Labor Expenses, 149–150
- Directing style of leadership, 236
- Discriminant validity, 295
- Dragonfly Effect, 159
- Dynamic capability, 16
- Dynamism, 161
- E-mail marketing, 35–36, 40
- Economic variables, 70
- Effective leaders, 48–49, 262
- Effective leadership, 51, 122, 124, 126, 260
- Efficiency, 77
- Electrical energy, 105
- Electricity, 211
- Electronic commerce (E-commerce) (*see also* International trade), 26–27, 29–30  
     advantages, 30–31  
     disadvantages, 31  
     future of, 31–32
- Emotional intelligence, 260, 263–267
- Emotional quotient, 265–266
- Employee, 2, 5, 11–12, 14  
     motivation, 61–62  
     satisfaction and commitment, 61
- Enigma code, 108
- Enterprise Resource Planning (ERP), 149, 213–214

- Enterprise Strategy Report, 176
- Enterprises, 27, 150
  - Industry 4.0 in, 142–145
- Entertainment, 39
- Entrepreneurial creativeness, 75
- Entrepreneurship, 195
- Environment, 55
- Environmental performance, 291, 293
- Environmental sustainability, 288
- Expectancy, 6
- Expert, 184–185
- Explanatory factor analysis, 309, 316
- External gamification, 39
  
- Facebook, 38
- Factor loading, 295
- Female leader
  - agile leadership and female managers, 131–132
  - leadership styles, 123–128
  - leadership theories, 122
  - in perspective of agile leadership, 129–130
  - women managers and leaders, 128–129
- Fiedler's contingency approach, 5
- Financial assets, 79n1
- Financial indicators, 150
- Financial strategies, 147
- Firms, 29, 70–71, 304
- First Industrial Revolution (*see* Industry 1.0)
- Fish swarm organization, 163
- Five points Likert scale, 310
- Flexibility, 52, 178, 220, 304
  - ability, 218
- Formal organizational structure, 305
- Foursquare-Swarm application, 39
- Fourth Industrial Revolution (*see* Industrial 4.0)
- Free-Rein leadership, 124–125
  
- Gamification, 38–39
- Gender discrimination, 128
- General System Theory, 157
- Germany Trade & Invest (GTAI), 210
- “Glass Ceiling Syndrome”, 128
- Global Value Chains, 71
- Globalization, 2, 6, 26, 140, 210
- Goodness-of-fit indexes, 313
- Governance, 226
- Great Man Theory, 122, 129
- Green supply chain management (GSCM), 286, 288, 291, 294, 298
- Gross domestic product (GDP), 234
  
- Health services, 52
- Healthcare, 53
  - agile leadership and sub-dimensions, 49–52
  - agile leadership model in, 48, 54–55
  - antecedents of agile leadership, 55–60
  - organizations, 47–48
  - outcomes of agile leadership, 60–62
- Hersey and Blanchard's contingency model, 6
- High-volume modeling capabilities, 111
  
- I4 technologies, 289–290
- Individualized consideration, 9
- Industrial Internet, 88, 104
- Industrial Internet of Things (IIoT), 213
- Industrial Revolution, 86, 194
- Industrial Wireless Networks, 106
- Industrialization, 69
- Industry 1.0, 27, 72, 140, 195
- Industry 2.0, 27, 72, 91, 140, 195, 212
- Industry 3.0, 27, 72, 91–92, 195–196, 212
- Industry 4.0, 2, 6, 26–27, 48, 71, 75, 82, 86, 88–90, 102–104, 141, 147, 150, 194–198, 211–212, 241–242, 286, 294, 297–298
  - and agile firms, 224–226

- competitive advantage, business
  - sustainability and, 242–243
- components, 212–215
- development in Turkey, 78–80
- in different sectors, 215–216
- effect on international trade in
  - Turkey, 80–81
- and environmental performance, 289–290
- expected effects of Industry 4.0 on
  - accounting, 146–151
- relationship between strategic leadership and, 202–205
- revolution, 139, 148
- Influencer marketing, 38
- Information and Communication Technologies (ICT), 87, 106, 143, 289
- Information technology (IT), 147, 26, 150, 173
- Innovation, 59, 75, 158
- Innovative organizations, 59
- Inspirational motivation, 9
- Instagram, 38
- Internal gamification, 39
- International Labour Organisation (ILO), 93, 129
- International trade, 76
  - firms, 70–71
  - Industry 4.0 development in
    - Turkey, 78–80
  - effect of Industry 4.0 on
    - international trade in
      - Turkey, 80–81
  - Industry 4.0, 70, 72–75
  - technological developments, 69–70
  - theoretical framework, 75–78
- Internet, 26, 39, 41
  - internet-based software, 26
- Internet of Things (IoT), 41, 70, 73, 82, 86, 88, 104, 141, 148, 194, 203, 210, 213–214, 289
- Interoperability, 142
- Istanbul Chamber of Industry (ICI), 309
- Job
  - performance of agile leader, 62
  - polarisation, 89
  - satisfaction, 240–241
- KMO, 295–297, 309
- Knowledge, 204
- Kolmogorov-Smirnov and Shapiro-Wilk tests, 318
- Labour force, 93
- Labour market, 88
  - digitised production, 87–88
  - impact of industry, 94–98
  - Industry 4.0 effects on, 89–90
  - New Industrial Revolution, 86–87
  - technological development, 88–89
  - technological unemployment, 93–94
  - theoretical framework, 90–93
- Laisses-Faire leadership, 8, 124–125
- Leaders, 53
- Leadership (*see also* Agile leadership; Strategic leadership), 2–3, 122, 126, 172, 183, 202, 260–261
  - agility, 187
  - behavioral theories, 4–5
  - business sustainability and
    - organization's performance, 243–244
  - contingency theories, 5–6
  - cross-loadings, 249–250
  - data analysis and findings, 245–247
  - direct effect, 251
  - factor loadings, 248
  - Industry 4.0, 241–243
  - job satisfaction and business
    - sustainability, 240–241
  - organizational performance, 238
  - research methodology, 244–245
  - style and organization
    - performance, 238–240
  - styles, 122–128, 236–238

- theories of, 3
- trait approach in, 262
- trait theory, 3–4
- Lean management, 58
- Lean manufacturing practices (LMP), 286, 293, 298
  - mediating effect of, 290–291
- Lean thinking, 174
- Learner resourcefulness, 264
- Learning
  - autonomy, 260–261, 263–265
  - organizations, 60
- Likert scale, 294
  
- Machine learning, 86, 109–110
- Mahalanobis distance coefficient, 318
- Management by-Exception, 7, 126
- Management style, 126
- Managerial Grid, 4
- Marketing (*see also* Digital marketing), 28
- Marketing 4.0, 26
  - marketing from 1.0 to, 28–29
- Mass customisation, 87
- Massachusetts Institute of Technology (MIT), 41
- Maximum likelihood calculation method, 310
- McGregor's theory, 5
- Mechanical organizations, 305
- Mechanical Taylorism, 112
- Mechanisation, 92
- Mechatronic systems, 74, 83, 102
- Media and techniques in digital marketing, 35–41
- Mobile cell phones, 36
- Mobile marketing, 36–37
- Model fitness, 295–297
- Modern foreign trade theory, 75–76
- Modern leadership styles
  - agile leadership, 14–15
  - Industry 4.0, 2
  - leadership, 2–3
  - modern leadership theories, 6
  - strategic leadership, 11–13
  - technological leadership, 10–11
  - theories of leadership, 3–6
  - transactional leader, 7–8
  - transformational leader, 8–10
  - visionary leadership, 13–14
- Modularity, 143
- Motivation theory, 265
  
- Neo-Taylorism, 112
- Neural networks, 110
- New Industrial Revolution, 86–87
  
- 'One-size-fits-all' solution, 175
- Operational agility, 217
- Organic organizations, 305
- Organisational agility (OA), 48, 55, 172, 176, 215
  - and agile firms, 217–220
  - agile leadership, 182–184
  - agility, 173–175
  - agility and, 217–224
  - benefits of being agile organisation, 181–182
  - characteristics and multidimensional nature of, 177–181
  - dimensions model, 220
  - emergence of, 175–177
  - levels and competencies of agile leadership, 184–186
  - model components and AWRM, 220–224
  - place of agile leadership in OA, 186–187
- Organization culture (OC), 201, 260, 268–269
- Organization performance, 234
  - business sustainability and, 243–244
  - Industry 4.0 and, 241–242
  - leadership style and, 238–240
- Organization(al), 122, 203
  - model in bumblebees, 159–160
  - performance, 238
  - politics, 267
  - structure, 304–305

- sustainability, 288
- variables, 181
- Organizational flexibility, 304–306, 323
  - variables, 309–311
- p*-value of Bartlett's globality test, 313, 317
- Participating style of leadership, 237
- Partnership agility, 217
- Passive management, 8
- Path analytic study
  - analysis and findings, 318–323
  - competitive advantage variables, 314–318
  - competitive strategy, 304–305
  - competitive strategy variables, 311–314
  - measurement of variables, 308
  - organizational flexibility variables, 309–311
  - organizational performance, 307
  - questionnaire form, 308–309
  - research method, 306
  - results, 323–324
  - review of literature, 305–306
  - sample and data, 308
- Path-Goal theory, 5–6
- Patients/customers, 57
  - satisfaction and commitment, 61
- Payment methods, 149
- People-oriented leadership, 5
- Performance, 234
- Persistence in learning, 264–265
- Personal skills, 145
- Personalized presentations, 34
- PLS-SEM, 245, 270
- Politics, 267
- Politicals, 261
- “Post-COVID-19”, 228
- Postmodern revolution-Fourth Industrial Revolution, 70
- Practices Directed towards Mastering Change, 180
- Practices Valuing Human Resources, 180
- Proactive personality, 60
- Questionnaire, 270, 308
- Questionnaire-based survey method, 292
- Quickness, 52, 225
- r-square value ( $R^2$  value), 247
- Radio Frequency Identification (RFID), 213–24
- Real Time Production, 143
- Real-time evaluations, 145
- Reddin's 3-D leadership model, 6
- Resource-based view (RBV), 304
- Responsiveness, 178
- Responsiveness, 220
- Returns on investment (ROI), 240
- Revolution, 72
- Robot technology, 108, 146
- ‘Routinisation’ hypothesis, 89
- Scientific management, 104, 112, 114
- Search Engine Marketing (SEM), 37–38, 297, 319
- Search Engine Optimization (SEO), 37–38
- Second industrial revolution (*see* Industry 2.0)
- Second-order multiple model, 313
- Security, 147
- Self-development, 62
- Self-leadership agility, 15, 186
- Self-management, 210
- Self-regulation, 266
- Senism, 228
- Shareholder theory, 159
- Simulation, 87
- Situational leadership theories, 5–6
- Skill bifurcation, 88
- Skill-based technological change hypothesis, 89
- Small and Medium Enterprises (SMEs), 79n1, 234–235, 244–245
- Smart Factory, 74, 87, 141–142, 210, 213
- Smart machines, 147
- Smart robots, 139–140

- Smart software, 73–74, 82, 102
- Smart tools, 87
- Snapchat, 38
- Social
  - factors, 58
  - insect colony, 162
  - media marketing, 39–40
  - networking sites, 38
  - sciences, 210
- Speed, 220
- Speedo mimicking, 158
- Stakeholder agility, 15, 186
- State politics, 267
- Strategic culture, 201
- Strategic fiction, 201
- Strategic leader, 12, 125
- Strategic leadership (*see also* Agile leadership), 11–13, 194, 198–202
  - industrial field, 193–194
  - Industry 4.0, 194–198
  - relationship between Industry 4.0 and, 202–205
- Strategic management, 199
- Strategic staff, 201
- Structural equation model (SEM), 308
- Structural transformation, 92
- Süper organic organization models
  - inspired by termites, 163–164
- Supply chain sustainability, 293
- Sustainability, 288
- Sustainable leadership, 126
- Swarm intelligence organization, 161–163
- SWOT analysis method, 125
- Synergist, 185
- Systematic development, 10
  
- Taylorism, 112
- Technological advances, 72
- Technological development, 69–70, 88, 113
- Technological innovations, 86, 88
- Technological leadership, 10–11
- Technological progress, 88, 94, 97
- Technological unemployment, 89–90, 93–94, 102
- Technology, 52, 57–58, 71, 114
  - technology–employment effects, 90
  - tracking, 53–54
- Termites, 163–164
- Textile sector, 260
- Thailand's garment industry
  - apparel industry retail value in Thailand, 286
  - convergent validity and factor loading, 295
  - demographics, 294
  - descriptive statistics, 294–295
  - discriminant validity, 295
  - environmental performance, 289–290
  - Industry 4.0 technology, 289–290, 297–298
  - literature review and theoretical background, 288
  - measures, 293–294
  - mediating effect of GSCM practices, 291
  - mediating effect of LMP, 290–291
  - methodology, 292
  - model fitness and KMO, 295–297
  - number of production factories, trading companies and retailers, 287
  - organizational sustainability, 288–289
  - sample and data characteristics, 292
  - SEM, 297
- Third Industrial Revolution (*see* Industry 3.0)
- 3D printing, 70, 86–87
- Traditional leadership theories, 6
- Traditional marketing
  - communication activities, 39
  - comparison of digital marketing and, 34–35
  - methods, 34
- Trait theory, 3–4, 122, 123
- Transactional leader, 7–8

- Transactional leadership, 237–238, 262
  - relationship between organization performance and, 239
  - theory, 123
- Transformational leader, 8–10
- Transformational leadership, 122–123, 125–126, 237, 262
  - relationship between organization performance and, 239–240
- Turing test, 108–109
- Turkey, Industry 4. 0 development in, 78–80
- Turkish Industrialists' and Businessmen's Association (TUSIAD), 215
- Twitter, 38
  
- Uncertainty, 174–176, 179–182, 182–183
- Unemployment, 91, 93
  - rate, 102
  - in Turkey and European Countries, 94–98
- Uniformity, 268–269
- Unrelated-Three Factor Model, 313
- US Department of Defence, 175
  
- Valence, 6
- Velcro technology, 156
- Vine (social networking sites), 38
  
- Viral marketing, 40–41
- Virtual reality, 74, 83
- Virtualization, 142
- Visionary leadership, 13–14
- Visionary personality, 10
- Volatility, 172, 174
- Volatility, Uncertainty, Complexity, atmosphere (VUCA), 174–175
- Vroom–Yetton leadership model, 6
  
- White-collar jobs, 90
- Women leaders, 260, 262
- Women leadership in Asia
  - cross-loadings in Malaysia, 284
  - cross-loadings in Thailand, 283
  - data analysis and findings, 270–274
  - data screening in Malaysia, 282
  - data screening in Thailand, 281
  - emotional intelligence, 263–267
  - learning autonomy, 260–261, 263–265
  - literature review, 261
  - organization culture, 268–269
  - political differences, 267
  - research methodology, 270
  - women leaders, 262–263
- Women managers, 122
  - and leaders, 128–129