

Index

- Actionability, 15–16
- Advantageousness, 15–16
- Analytic hierarchy process (AHP), 39, 47, 154
- Artificial node, 25

- Benefits, opportunities, costs, and risks (BOCR), 39
 - indicator, 47
 - methodology, 50
- Bickering, 13
- BOCR. *See* Benefits, opportunities, costs, and risks (BOCR)
- Brazil, Rio de Janeiro, 78–80, 84, 88
 - See also* Urban freight transportation (UFT)
- BSW. *See* Bus-stops of water (BSW)
- Building the network, 25
- Business logistics, 9
- Business objectives and customer requirements, 10
- Bus-stops of water (BSW), 115
 - distribution nodes, 115
 - families distribution per cluster, 118
 - location, 121
 - network model, 120
 - result, 120
 - total capacity storage, 123
 - total cost analysis with, 126
 - transaction cost and, 122–123
 - unadjusted, 119

- Calaminas, 113
- Capacitated facility location
 - problem. *See* Two-stage capacitated facility location problem (TSCFLP)
- Capacitated Plant Location Model (CPL Model) structure, 157
- CAPEX. *See* Capital expenditures (CAPEX)
- Capital expenditures (CAPEX), 179
- Center for Latin-American Logistics Innovation (CLI), 2
- Center for Logistics and Transportation of the Massachusetts Institute of Technology (CTL-MIT), 96
- Center for Logistics Systems Innovation at University of São Paulo (CISLOG/USP), 136
- Center of Excellence in Sustainable Urban Freight (CoE-SUFS), 136, 139
- Chapinero, 97–98
- City logistics, concept, 94
- Clarity, 12, 16
- Clear SCS, 12
- Clustering search (CS)
 - heuristic, 20
 - CPLEX and, 28–32

- direct assimilation, 27
- function, 27
- Hamming distance, 27
- new center, 27
- parameters, 28
- pseudocode, 26
- step-by-step, 25–26
- Coe-SUFS, 136
- Coherence evaluation, 13, 16
- Collaborative management
 - research, 11
- Colombia, 94, 96–98
- Colon Free Trade Zone, 62, 67
- Commercial logistic activities
 - Historic Center and La Mariscal in Quito – Ecuador, 150–151
 - mathematical modeling
 - analytical hierarchy process, 156
 - optimization model, 157
 - sample size, 155–156
 - methodologies
 - data collection and preparation, 152–153
 - data extrapolation, 153
 - optimization model, 154–155
 - simulation model, 155
 - stores and streets weights, 153–154
 - results and discussion
 - data collection and preparation results, 157–161
 - optimization model results, 161–164
 - simulation model results, 164–166
 - urban logistics application, 151–152
- Commercial solver CPLEX, 25
- Compatibility evaluation, 13, 16
- Competence and resources, 14
- Competence test, 14
- Competitive logistics
 - infrastructure, 62
- Conditional value at risk (CVaR), 173, 176
- Conflicts, 13
- Consistency, 11, 13
 - coefficient calculation, 49
- Consistency index (CI), 46
- Consistency ratio (CR), 46
- Consonance, 13–14
- Constraints, 23
- Construction and demolition
 - waste, annual generation, 41
- Cost cash flow, 178
- Cost minimization, water
 - distribution system, 120–122
- Costs analysis, water distribution
 - system, 125–127
- Coverage, 11–12, 16
- CPLEX, 25
- Crisp pairwise comparison matrix, 48
- Crisp weights of vectors, 47
- Criteria, facility location
 - determination, 42–43
 - groups of, 43
- Cumulative impact, 13
- Customers, VALS in Panama
 - Canal, 64–65, 68–70
- Customer's expectation ranking, 69
- CVaR. *See* Conditional value at risk (CVaR)
- Decision-making tools, 39
- Delivery tracking, 96
- Department of Road System
 - Operations (DSV), 136

- DET. *See* Distribution by electric tricycles (DET)
- Disposal practices, 40
- Disruptive violations, 96
- Distribution by electric tricycles (DET), 80–81
- data collection, 82
 - economic assessment method, 82–84
 - environmental assessment method, 84–86
 - fixed and variable costs of, 86
 - measurement parameters, 86
 - monthly cost comparison, 87
 - pollutants and GHG emission reduction, 87–88
 - productivity, 87–88
 - results and analysis, 86–88
 - Shapiro-Wilk test, 82–83
 - strategies, 80–81
- See also* Urban freight transportation (UFT)
- Dominant approach, 10–11
- Drug trafficking, 71
- ECLAC. *See* Economic Commission for Latin America and the Caribbean (ECLAC)
- Economic Area, Panamá Pacific, 63
- Economic Commission for Latin America and the Caribbean (ECLAC), 57
- Ecuador, 150
- ELECTRE, 51
- Evaluation criteria, 11, 12–15, 16
- External consistency, 13–14, 16
- Facility location, 38–39, 42, 51
- See also* Two-stage capacitated facility location problem (TSCFLP)
- Facility location problem (FLP), 20
- FAHP. *See* Fuzzy-AHP (FAHP)
- Family cluster (FC), 118
- Feasibility, 14–16
- Financial risk measurement
- coherent risk measure, 177
 - conditional value at risk (CVaR), 173, 176
 - cost cash flow, 178
- Free on Board (FOB), 173–174
- inventory policies, 172–173
- log-return of LME aluminum prices, 175
- London Metal Exchange (LME), 173
- methodological approach, 174
- methodology, 174–177
- Monte Carlo simulation (MCS), 173
- net present value (NPV)
- calculation, 173
- profit function distribution, 177
- results and discussion, 177–179
- sales prices probability, 179
- Value at Risk (VaR), 172, 176
- working capital management (WCM), 172
- working capital (WC), 172
- Financial supply chain management (FSCM), 172
- First-order strategic fit, 13
- Flow cost calculation, 24
- FLP. *See* Facility location problem (FLP)
- Frame test, 12
- Free on Board (FOB), 173–174
- Free-scale network, 124
- Freight transport, 78, 168–169
- Fuel consumption, 101–102
- Fuzzy-AHP (FAHP), 39, 43, 51

- Fuzzy logic, 37, 39–40, 46, 51
- Fuzzy pairwise comparison matrix, 48
- Fuzzy scale, 48

- Genetic algorithm (GA), 20
- Global value chains, VALS, 58
- Goal consistency, 13
- Goal programming (GP), facility location, 39
- Gross inconsistencies, 13

- Historic Center in Quito
 - commercial density of, 158
 - deliveries peak hours, 159
 - freight-unloading methods, 167
 - km², 149–151, 157–158
 - loading and unloading bays, 162
 - optimization model, 161–165
 - shop density by shop type in, 158
- HORECA (hotels, restaurant, coffee shops) area, 96–97
 - See also* Urban freight transportation (UFT)
- Human settlements (HS), 112–113
- Hybrid heuristic method, 2
 - clustering search (CS), 20
 - computational experiments, 27–33
 - computational modeling, 23–24
 - CS metaheuristic, 25–27
 - network flow cost, 24–25
 - problem description, 21–23
- Integrated organization, 14
- Inter-American Development Bank (IDB), 1, 63

- Internal consistency, 12–13, 16
- International Air Transport Association (IATA), 57
- International Financial Center of Panama, 57
- Interoceanic Panama Canal, 56
- Inventory policies, 172–173
- Investment, 57, 64, 71

- Key performance indicators (KPIs)
 - area definition and selection, 96
 - data further analysis and conclusions, 97
 - determination, 97
 - impact, 96
 - information gathering and analysis, 96–97
 - in urban freight transport operations, 95
- Km² methodology
 - KPIs determination for, 97, 101–104
 - urban logistic operations, 95
 - Zona T, 98–99
 - See also* Key performance indicators (KPIs)

- Labeling service, 66
- La Mariscal in Quito, 151
 - commercial density of, 160
 - deliveries peak hours, 161
 - entertainment district, 151
 - feasible bays in, 166
 - freight-unloading methods, 167
 - km², 152–153
 - loading and unloading bays, 152
 - optimization model, 155, 162–163, 165
 - shop density by shop type in, 160

- Last mile, 79–80, 88–89
 - distribution networks, 150
- LDV. *See* Light-duty vehicle (LDV)
- Lead, disposal emission, 79
- Level of service (LOS), 82–83
- Light-duty vehicle (LDV), 81
- Likert scale, 65
- LME. *See* London Metal Exchange (LME)
- Loading bays, 151–155, 162–165, 167–168
- Localidades*, 97
- Location cost, 21
- Logistical decision problems, 51
- Logistic Profile (LP), 152
- Logistics customer value, VALS, 58
- Logistics reflexing, 63
- Logistics service quality (LQS), 59
- Logistics Strategic Plan, 71
- Logistics Strategic Plan of Panama to 2030 (2017), 62
- London Metal Exchange (LME), 173
- LP. *See* Logistic Profile (LP)
- LQS. *See* Logistics service quality (LQS)
- Marketing and Commercial Department of the Panama Canal, 62
- Marking service, 66
- MASL. *See* Meters above sea level (MASL)
- Master production schedule (MPS) technique, 115
- Matheuristic, 20–21, 27, 33
- MCS. *See* Monte Carlo simulation (MCS)
- MD. *See* Mobile depots (MD)
- Means-end value hierarchy model (MEVHM), 55, 61
- Medical and pharmaceutical, VALS, 65
- Megacity, 96
- Mentzer methodology, 65
- Meters above sea level (MASL), 113
- Metropolitan Region of São Paulo (MRSP), 132
- MEVHM. *See* Means-end value hierarchy model (MEVHM); Model hierarchy middle-end (MEVHM)
- MILP. *See* Mixed-integer linear programming (MILP)
- Ministry of Trade and Industry, 63
- Mixed-integer linear programming (MILP), 115, 120
- Mobile depots (MD), 81
- Mobility, 94–95
- Model hierarchy middle-end (MEVHM), 70
- Monte Carlo simulation (MCS), 153, 168, 173
- MPS technique. *See* Master production schedule (MPS) technique
- Multicriteria decision analysis (MCDA), 39, 51
 - analytic hierarchy process (AHP), 39
 - Analytic Network Process (ANP), 39
 - use, 39
- Multicriteria methodology construction and demolition waste, annual generation, 41

- first stage: structuring the problem, 42–43
 - second stage: analysis of the problem
 - alternatives evaluation, 43
 - hierarchies diagram, 45
 - matrices for diffuse pairs, 45–48
 - potential final disposal sites, location map, 44
 - score and rankings, 46
 - triangular scale for fuzzy number conversion, 45
- Multimodal distribution system, 113
- National Association of Freight Transport and Logistics, 83
- National Logistics Plan, 71
- Net Operating Profit after Taxes (NOPAT), 179
- Net present value (NPV)
 - calculation, 173
- Network connectivity, 116–118
- Network demand, 25
- Network modeling, 25
- Nonbinary modeling, 24
- NOPAT. *See* Net Operating Profit after Taxes (NOPAT)
- Normalized sums of rows, 49
- Oceanic Zone development, 62
- Off hour delivery (OHD) pilot test, 3
 - cash incentives, 135
 - New York, 134–135
 - São Paulo, 136
 - stakeholders, 135
 - truck restriction zone, 133
 - See also* São Paulo off-hour delivery pilot project
- Organization and SC execution, 11
- Packaging service, 66
- Pamplona Alta, 113
- Panama Canal, VALS in, 3
 - benefits over final product, 69
 - competitive logistics infrastructure, 62
 - concept of servicization of business, 58
 - customers, 64–65, 68–70
 - customer's expectation ranking, 69
 - definition, 58–59
 - features, 59
 - future research, 72–73
 - global value chains, 58
 - impact, 70–71
 - logistical development, 57
 - logistics customer value, 58
 - logistics service quality (LQS), 59
 - means-end value hierarchy model (MEVHM), 61
 - model hierarchy middle-end (MEVHM), 70
- Oceanic Zone development, 62
 - offered to international cargo, 59–61
- 3PL (third-party logistics) providers, 59, 62–63
- providers, 64–68
- quality during logistics processes, 59
- quality of logistics services (QLS), 59–61
- service offered, 60–61
- services diversification, 62
- ship terminals (cruise and cargo), 61–62
- terminology, 67
- total cost, 58
- type by company, 66

- user-based approach, 59
- value-added services (VAS), 58
- Panama Canal Universal Measurement System (PCUMS), 56
- Panama Logistics Strategic Plan, 63
- Panama Logistics Summit 2014, 63
- Panama Maritime Authority (AMP), 66
- Panama Pacific Special Economic Area, 57
- Parsimony, 15–16
- PenLog (2014), 62
- 3PL (third-party logistics) providers, 59, 62–63
- Priority vector, 49
- Production capacity, 21
- Profit function distribution, 177
- Project indicators, 50
- Project priority, 50
- PROMETHEE, 51
- Providers, VALS, 64–68
- Quality of logistics services (QLS), 58–61
- Raw material supply model. *See* Financial risk measurement
- Regional alliance, 2
- Regional Autonomous Corporation of Valle del Cauca (CVC), 42
- Research agenda, 2–4
- Riskiness, 15–16
- Risk measures. *See* Financial risk measurement
- Roads and regulations, 96
- Road transport emissions, 95
- Sales prices probability, 179
- São Paulo Motor Carrier Syndicate (SETCESP – *Sindicato de Empresas de Transporte de Carga de São Paulo e Região*), 136
- São Paulo off-hour delivery pilot project, 136–139, 146
 - costs and productivity, 143–145
 - noise, 139–141
 - safety, 141–142
 - traffic and truck speeds, 142–143
- SCS. *See* Supply chain strategy (SCS)
- Second-order strategic fit, 13
- SEDAPAL, 112–113
- Services diversification, 62
- Servicization of business, 58
- SETCESP, 136, 138
- Shapiro-Wilk test, 82–83
- Shop inventory, 97, 99
- Simple consistency, 13
- Solid waste, 38, 40, 42
- Solid waste disposal center
 - multicriteria methodology
 - construction and demolition waste, annual generation, 41
 - first stage: structuring the problem, 42–43
 - second stage: analysis of the problem, 43–48
 - problems, 40–41
 - results and discussion
 - BOCR methodology, 50
 - consistency coefficient calculation, 49
 - crisp pairwise comparison matrix, 48
 - decision-making process, 51

- employment generation, 48
- fuzzy pairwise comparison matrix, 48
- logistical decision problems, 51
- multicriteria tool, 51
- normalized sums of rows, 49
- priority vector, 49
- project indicators, 50
- project priority, 50
- sums of rows for each criterion, 49
- Specific distribution model, 123–125
- Square kilometer (km²) methodology, 151
- KPIs determination for, 97, 101–104
- urban logistic operations, 95
- Zona T, 98–99
- Storage capacity, 21
- Strategic fit, 13
- Sufficiency, 14, 16
- Supervision of Residential Public Services, 38
- Supply chain
 - description, water distribution system, 113–114
 - logistics and, 63, 67
 - shareholders profitability and, 58
 - system with two plants, three depots and five customers, 21–22
 - See also* Supply chain strategy (SCS)
- Supply Chain And Logistics Excellence (SCALE) Network, 2
- Supply chain strategy (SCS), 9
 - clarity, 12
 - coverage, 12
 - different approach, 11–12
 - dominant approach, 10–11
 - external consistency, 13–14
 - feasibility, 14–15
 - internal consistency, 12–13
 - proposed evaluation criteria, 16
 - purposes, 12
 - sufficiency, 14
 - support, 14
 - terms of, 10
 - typology, 10
- Support, 11, 14, 16
- Synergy, 16
- TCAT. *See* Total Cost after taxes (TCAT)
- Third parties, 15
 - See also*, 3
 - PL (third-party logistics) providers
- TID. *See* Traditional intermodal distribution (TID)
- Tocumen International Airport, 57
- TOPSIS, 51
- Total Cost after taxes (TCAT), 175–176
- Traditional intermodal distribution (TID)
 - data collection, 82
 - economic assessment method, 82–84
 - environmental assessment method, 84–86
 - fixed and variable costs of, 86
 - measurement parameters, 86
 - monthly cost comparison, 87
 - pollutants and GHG emission reduction, 87–88
 - productivity, 87–88
 - results and analysis, 86–88
 - Shapiro-Wilk test, 82–83

- strategies, 80–81
 - See also* Urban freight transportation (UFT)
- Traffic count, 97, 99
- Transfer stations, 38
- Transportation cost, 21
- Transport cost minimization, 115
- Trapezoidal fuzzy numbers, 39
- Tricycles, 78–79
 - See also* Distribution by electric tricycles (DET)
- Two-echelon location routing (2ELR) using integer programming (IP), 115
- Two-stage capacitated facility location problem (TSCFLP), 19
 - genetic algorithm (GA), 20
 - goal, 20
 - humanitarian supply chains, 20
 - Lagrangian cut-and-relax, 20
 - national postal distribution center (plant), 20
- Typology, 10
- UFT. *See* Urban freight transportation (UFT)
- Unloading bays, 151–155, 162–165, 167–168
- Urban freight activities, 151–152
- Urban freight policy-makers, 150
- Urban freight transportation (UFT)
 - benefits, 78
 - data collection, 82
 - eco-efficiency analysis, 78
 - economic assessment method, 82–84
 - economic indicators, 78
 - electric bicycles, 79
 - electric bikes and tricycles, 78–79
 - electric cargo bikes, 79–80
 - environmental assessment method, 84–86
 - light electric vehicles, 78
 - microscopic traffic simulation model, 79–80
 - operations
 - area definition and selection, 96–98
 - data further analysis and conclusions, 97, 103–104
 - impact, 96
 - information gathering and analysis, 96–101
 - KPIs determination, 97, 101–103
 - results and analysis, 86–88
 - strategies, 80–81
 - traffic congestion, 79
 - urban logistics activities, 78
 - vehicles, occupancy rate of, 78–79
 - zero-emission vehicles, 79
 - See also* Distribution by electric tricycles (DET); Traditional intermodal distribution (TID)
- Urban freight vehicles, 133
- Urban logistics, 3–4
 - application, 151–152
 - in Latin America, 150
 - location models and timing simulation of dynamic flows, 168
 - measures in HORECA intensive area, 93–105
 - urban freight transportation, 169
- Urban Logistics Atlas approach, 151–153
- Uruguay, 15
- User-based approach, VALS, 59

- Valle del Cauca, 40–41
 - annual generation of
 - construction and demolition waste, 41
 - multicriteria methodology
 - construction and demolition waste, annual generation, 41
 - first stage: structuring the problem, 42–43
 - second stage: analysis of the problem, 43–48
- Value-added logistics services (VALS) in Panama Canal, 3
 - benefits over final product, 69
 - competitive logistics
 - infrastructure, 62
 - concept of servicization of business, 58
 - customers, 64–65, 68–70
 - customer's expectation ranking, 69
 - definition, 58–59
 - features, 59
 - future research, 72–73
 - global value chains, 58
 - impact, 70–71
 - logistical development, 57
 - logistics customer value, 58
 - logistics service quality (LQS), 59
 - means-end value hierarchy model (MEVHM), 61
 - model hierarchy middle-end (MEVHM), 70
 - Oceanic Zone development, 62
 - offered to international cargo, 59–61
 - 3PL (third-party logistics) providers, 59, 62–63
 - providers, 64–68
 - quality during logistics processes, 59
 - quality of logistics services (QLS), 59–61
 - service offered, 60–61
 - services diversification, 62
 - ship terminals (cruise and cargo), 61–62
 - terminology, 67
 - total cost, 58
 - type by company, 66
 - user-based approach, 59
 - value-added services (VAS), 58
- Value-added services (VAS), 58
- Value at Risk (VaR), 172, 176
 - See also* Financial risk measurement
- VaR. *See* Value at Risk (VaR)
- VAS. *See* Value-added services (VAS)
- Vector prioritization, 47
- VUC's (*vehículo urbano de carga*), 133
- Waste management, 2–3
- Water connectors (WC), 120, 122
- Water demand parameter, 116
- Water distribution system in low-income areas, 114–115
 - bus-stops of water (BSW), 115, 118, 120–124
 - cost minimization, 120–122
 - costs analysis, 125–127
 - current, proposed and adjusted proposed networks, 126
 - deficiencies issues, 114–115
 - demand determination, 116
 - distribution model proposed, 125
 - facility location model, 119–120

- families distribution per cluster, 118
- family cluster (FC), 118
- general distribution model, 122–123
- geographic location, 116
- master production schedule, 117
- model of connectivity, 118–119
- network connectivity, 116–118
- research question and hypotheses, 114
- specific distribution model, 123–125
- supply chain description, 113–114
- Torres Minas map, 117
- Torres Minas network, 121
- two-echelon location routing (2ELR) using integer programming (IP), 115
- water demand parameter, 116
- WC. *See* Water connectors (WC); Working capital (WC)
- WCI. *See* Working Capital Investment (WCI)
- WCM. *See* Working capital management (WCM)
- Weber Method, 115
- Windows 7 operating system, 28
- Workability test, 14
- Working Capital Investment (WCI), 179
- Working capital management (WCM), 172
- Working capital (WC), 172
- World Economic Forum for Competitiveness, 57
- World Urbanization Prospects, 2011 Revision, 94
- Zero-emission strategy, 87
- ZMRC. *See* Zone of Maximal Circulation Restriction (ZMRC)
- Zona T, 96
 - delivered products count in, 100
 - km² methodology, 105
 - proposed key performance indicators in, 104
 - shop inventory in, 99
 - time frame, stores, and trips for delivered products count in, 101
 - traffic count in, 100
 - traffic disruptions in, 102
 - See also* Km² methodology
- Zone of Maximal Circulation Restriction (ZMRC), 137–138, 142, 145