OPERATING INSTRUCTIONS • DISRUPTION-PROOF SUPPLY NETWORK PACK

This working pack provides fillable logs, diagnostic worksheets, corridor chokepoint audits, and mathematical safety-stock calculators for business continuity managers, supply chain directors, and operations engineers. Grounded in ASCM Enterprise Standards and ISO 28000 framework requirements, every worksheet executes operational principles defined in *Supply Chain Resilience (2026)*.

Worksheet 1 (Part A): 4-Step Risk Mapping Protocol & 80% Spend Prioritization

WORKSHEET 1

Execution Standard: Begin by ranking your direct procurement expenditure. Organizations that attempt to map 100% of their supply base stall in data collection. Focus mapping depth on the suppliers accounting for the top 80% of spend, plus any sole-source components whose failure halts production lines regardless of spend rank.

ORGANIZATION NAME	REVIEW DATE / LEAD AUDITOR	TARGET SPEND THRESHOLD COVERED
[Corporate Supply Network Entity]	October 31, 2026 • Lead Continuity Officer	Top 80% Total Direct Spend ($ Volume)

Rank	Component Category / SKU Group	Annual Spend ($)	% Total Spend	Cumul. Spend %	Primary Tier 1	Tier 2 Mapped?
1	Semiconductor Logic & Microcontrollers	$14,200,000	28.4%	28.4%	Apex Silicon Corp	**[X] Complete**
2	Custom Die-Cast Aluminum Housings	$9,800,000	19.6%	48.0%	Precision Castings MX	**[X] Complete**
3	High-Grade Synthetic Resin Pellets	$8,500,000	17.0%	65.0%	EuroPolymer BV	**[!] Partial (Tier 2 sole)**
4	Precision Multilayer Circuit Boards	$7,600,000	15.2%	80.2%	Delta Tech Suzhou	**[ ] Unmapped (Action req)**
5	*[Sole-Source Critical Exception]* Sensor Pin	$350,000	0.7%	80.9%	MicroSensors Ltd	**[!] Single Fabricator**
6						[ ] Complete [ ] Partial
7						[ ] Complete [ ] Partial

Step 1: Supplier Tiering Verification Checklist

AUDIT CHECKLIST

- [✓] Tier 1 suppliers verified for physical facility locations (no PO box addresses).
- [✓] Sole-source and single-source dependencies explicitly flagged in ERP.
- [✓] Normal contractual lead times recorded alongside historical variance (σ_{LT}).
- [✓] Financial health monitoring active (Altman Z-score, debt covenants).
- [✓] Sub-tier disclosure required in Tier 1 master service agreements (MSAs).

Revenue Impact Prioritization Rules

SCORING MATRIX

Criticality Tier 1: Direct halt of highest-margin product lines within 72 hours. Dual-sourcing mandatory (70/30 split) with 45+ day buffer.

Criticality Tier 2: Halts secondary volume within 14 days. Pre-qualified warm-standby vendor with validated tooling required.

Criticality Tier 3: Readily available commodity with multiple regional spot sources.

Multi-Tier Dependency Audit Log

WORKSHEET 1 (PART B)

Document physical node relationships, geographic origins, single-source dependencies, lead times, and financial health scores across all supply tiers.

Node ID	Component Name	Tier 1 Supplier & City	Single Source?	Lead Time ($\bar{L}$)	LT Std Dev (σ_{LT})	Tier 2 Sub-Supplier / Fab	Tier 3 Raw Material Source
ND-01	Power Inverter Module	Apex Electronics (Penang, MY)	**YES**	45 Days	±18 Days	Sil-Fab Semiconductor (Hsinchu, TW)	Ultra-Pure Silicon (Gunma, JP)
ND-02	Cast Structural Frame	MetalCraft (Monterrey, MX)	NO	14 Days	±3 Days	Altos Hornos Mill (Monclova, MX)	Bauxite Ore (Coahuila, MX)
ND-03	Engineered Polymer Seal	EuroSeals NV (Ghent, BE)	**YES**	30 Days	±7 Days	Basell Petrochem (Wesseling, DE)	Crude Feedstock (Rotterdam, NL)
ND-04	OLED Controller Board	OptoTech Ltd (Suzhou, CN)	**YES**	60 Days	±24 Days	Wafer Foundry Z (Tainan, TW)	Rare Earth Oxides (Baotou, CN)
ND-05	Braided Wire Harness	CableWorks (Cluj-Napoca, RO)	NO	10 Days	±2 Days	Aurubis Copper (Hamburg, DE)	Refined Copper Cathode (Lubin, PL)
ND-06			[ ] Y [ ] N				
ND-07			[ ] Y [ ] N				
ND-08			[ ] Y [ ] N				
ND-09			[ ] Y [ ] N				
ND-10			[ ] Y [ ] N				

Financial Health & Operational Risk Indicators (Tier 1 & Tier 2)

HEALTH AUDIT

Supplier Name	Tier / Component	Altman Z-Score / Health	Revenue Concentration	Historical On-Time In-Full (OTIF)	Continuity Plan Status
Apex Electronics	Tier 1 (Inverter)	**Z = 3.2 (Safe Zone)**	Customer represents 18% rev	96.2% (Historical 12 mo)	Annual audited BCP on file (ISO 22301)
OptoTech Ltd	Tier 1 (OLED Board)	**Z = 1.9 (Grey Zone)**	Customer represents 34% rev	84.1% (↓ declining trend)	Unverified internal draft only
Sil-Fab Semiconductor	Tier 2 (Sub-wafer)	**Z = 4.1 (Safe Zone)**	Customer represents <2% rev	98.5% (High capacity utilization)	Formal disaster recovery program verified
[Fillable Row]		[ ] Safe [ ] Grey [ ] Distress			[ ] Verified [ ] Absent

Physical Path & Chokepoint Tracing Log

WORKSHEET 2

Trace the physical movement of freight from supplier origin to plant dock. Identify maritime passages, border crossings, transshipment hubs, and single-carrier exposure. Overlay climate and geopolitical risk indices.

Freight Corridor ID	Origin → Destination Path	Primary Maritime / Rail Hub	Identified Chokepoints	Carrier Concentration	Contingency / Alternate Route
COR-01 (Trans-Pac)	Penang (MY) → Long Beach (US)	Port of Tanjung Pelepas / POLB	Malacca Strait, POLB Terminal	Ocean Alliance (Carrier A 65%)	Reroute Oakland or air charter via KUL
COR-02 (East Asia)	Shanghai (CN) → Vancouver (CA)	Port of Shanghai / Port of Van	East China Sea, Van Intermodal	Single Ocean Carrier (80%)	Divert to Prince Rupert; rail transload
COR-03 (Cross-Border)	Monterrey (MX) → Dallas (US)	Laredo World Trade Bridge	Laredo Customs Border Post	Dedicated Mexican Drayage Line	Alternate crossing via Colombia Bridge
COR-04 (Trans-Atlantic)	Antwerp (BE) → Newark (US)	Port of Antwerp / NY-NJ Hub	English Channel, NY Harbor	Dual Carrier (50/50 split)	Divert to Baltimore or Philadelphia
COR-05 (Field Log)					

Chokepoint Vulnerability & Environmental Hazard Overlay

EXPOSURE AUDIT

Chokepoint Node	Node Classification	Climate / Weather Hazard Exposure	Geopolitical Risk Score	Max Transit Delay (Historical)
Strait of Malacca	Maritime Pass	Haze season visibility drops; monsoon surges	**Moderate (Piracy / Density)**	+6 to +10 Days (Slow steaming)
Suez Canal Route	Maritime Canal	Sandstorms, shallow drafts, vessel grounding	**High (Regional Conflict/Red Sea)**	+14 to +21 Days (Cape reroute)
Port of Long Beach / LA	Container Terminal	Seismic zone, severe storm swell, rail bottlenecks	Low (Labor contract negotiation cycle)	+8 to +18 Days (Berth dwell)
Laredo Border Crossing	Land Customs Gate	Severe heat wave tire blowouts; border flash flood	**Moderate (Inspection surge/policy)**	+2 to +5 Days (Inspection backup)
[Field Log Node]			[ ] Low [ ] Mod [ ] High	

Single-Carrier Dependency Audit & Capping Rules

CARRIER GOVERNANCE

Volume Capping Directive: No single shipping line, air cargo operator, or intermodal carrier may carry >40% of total inbound container volume for any single critical business unit. If carrier solvency drops, API integration breaches, or labor disputes emerge, contractual switchover to pre-contracted secondary carriers must occur within 24 hours.

Primary Ocean Carrier A: Volume %: ____ • Contract SLA: ____ • Alternate Carrier Pre-Contracted? [ ] Yes [ ] No

Primary Land Drayage B: Volume %: ____ • Contract SLA: ____ • Alternate Carrier Pre-Contracted? [ ] Yes [ ] No

The 4-to-1 Sub-Tier Concentration Audit Sheet

WORKSHEET 3

The Illusion of Diversification: Contracting with four independent Tier-1 suppliers creates false security if all four procure specialized microchips, castings, or chemical precursors from the exact same sub-tier manufacturer. Use this sheet to cross-index sub-tier manufacturers across all supplier contracts.

Critical Component	Contracted Tier 1 Suppliers	Declared Tier 2 Sub-Fabricators	Shared Sub-Tier Node?	True Redundancy Rating	Mitigation Priority
Integrated Sensor Board	Supplier A (US) Supplier B (MY) Supplier C (DE) Supplier D (SG)	**Silicon Wafer Fab Theta** (Hsinchu, TW) *All 4 buy wafers from Theta!*	**YES • 100% Shared** (4-to-1 Trap Confirmed)	**ILLUSORY (0%)**	**HIGH • Qualify Fab Y**
Structural Stamping	Vendor 1 (MX) Vendor 2 (US)	Mill Alpha (MX) Mill Beta (US)	**NO • Fully Independent**	**TRUE DIVERSIFIED**	LOW • Maintain 70/30
Specialty Solvents	Distributor X (NL) Distributor Y (UK) Distributor Z (FR)	**Chemical Complex Omega** (Antwerp, BE) *All 3 repackage from Omega*	**YES • 100% Shared** (Single Refinery Node)	**ILLUSORY (0%)**	**HIGH • Buffer 60d**
[Audit Target Line]			[ ] Yes [ ] No	[ ] True [ ] Illusory	
[Audit Target Line]			[ ] Yes [ ] No	[ ] True [ ] Illusory	

Geographic & Industrial Cluster Analysis

CLUSTER EXPOSURE

Industrial Park Aggregation: Even when suppliers are legally separate entities, locating inside the same industrial corridor exposes them to identical municipal power outages, seismic faults, local floodplains, and regional labor disputes.

Country / Industrial Zone	Active Tier 1 & 2 Nodes	Total % Spend Exposure	Risk Level
Penang Free Trade Zone (MY)	Apex Corp, Precision Wire, TechFab	34.2% of Total Spend	**HIGH**
Bajio Automotive Corridor (MX)	MetalCraft, AutoStamping, LaredoLine	26.5% of Total Spend	**MEDIUM**
Rhine-Ruhr Chemical Belt (DE)	EuroPolymer, ResinWerke	18.1% of Total Spend	**LOW**

Sub-Tier Concentration Scoring Formula

METRIC

$$\text{Concentration Index (CI)} = \Sigma\,(s_i)^2$$

Where s_i = share of sub-tier component volume supplied by facility i.

- **CI > 0.50:** Extreme concentration. Immediate dual-source qualification mandatory.
- **CI 0.25 - 0.50:** Moderate concentration. Hold strategic decoupling safety stock.
- **CI < 0.25:** Healthy diversification across verified distinct origins.

Portfolio Segmentation & Volume Allocation Matrix

WORKSHEET 4

Practical diversification follows portfolio segmentation. Organizations cannot afford active multi-sourcing for every SKU. Apply active multi-sourcing to high-margin critical lines, warm standby to high-volume goods, and strategic buffers to limited-alternative components.

Segment Category	Governing Sourcing Architecture	Operational Volume Allocation	Disruption Switchover Mechanism
High-Margin, High-Criticality Lines	Active Dual-Sourcing or Tri-Sourcing across distinct geographies. Higher unit cost accepted as resilience investment.	**70/30 Dual Split** (70% primary offshore, 30% nearshore) or **60/30/10 Tri-Sourcing** (60% offshore, 30% nearshore, 10% domestic).	Immediate surge command to active secondary. Tooling is already warm, staff trained, quality pre-qualified; volume shifts in <48 hrs.
Low-Margin, High-Volume Lines	Cost optimization dominates with pre-qualified contingency suppliers under formal reservation contracts.	**100% Primary Allocation** with audited backup suppliers on pre-negotiated standing standby agreements.	Contractually defined rapid switchover trigger. Tooling maintained at secondary plant; trial production run executed semi-annually.
Critical Components w/ Limited Alternatives	Strategic decoupling inventory, long-term supply agreements, priority allocation guarantees, or supplier equity stakes.	**Single Source with Mandated Buffer** (VMI at regional hub, minimum 60–90 days buffer stock maintained).	Direct draw from strategic buffer while emergency engineering executes alternate part qualification or rapid redesign.

Pre-Qualified Switchover Agreement Log

CONTRACT ROSTER

Product / SKU	Primary Supplier (70%)	Pre-Qualified Secondary (30%)	Validated Tooling On-Site?	Max Surge Capacity (% Vol)	Last Live Trial Production Date
Inverter Assy 101	Apex Corp (Malaysia)	Vanguard MX (Monterrey)	**[X] Yes (Active)**	Up to 100% within 14 days	September 15, 2026 (Passed QC)
Sensor Harness B	OptoTech (China)	EuroWire (Romania)	**[X] Yes (Active)**	Up to 80% within 21 days	August 10, 2026 (Passed QC)
Chassis Frame C	MetalCraft (Mexico)	Allied Stamping (Ohio, US)	**[X] Yes (Active)**	Up to 100% within 7 days	October 02, 2026 (Passed QC)
[Field Log Item]			[ ] Yes [ ] Pending		
[Field Log Item]			[ ] Yes [ ] Pending		

THE "BACKUP SUPPLIER" COLD-START TRAP

A secondary supplier who receives 0% baseline volume has unstaffed production lines, uncalibrated tooling, and untested material supply. The 30% allocation in 70/30 dual-sourcing is an operational insurance policy: it ensures your emergency switchover is a simple volume shift rather than an untested cold start.

Supply Chain RTO / RPO Foundations

WORKSHEET 5

Supply Chain Recovery Time Objective (RTO): The maximum tolerable elapsed duration before physical component/goods flow must be restored after a disruption without triggering customer contract penalties or brand default.

Supply Chain Recovery Point Objective (RPO): The maximum tolerable data loss or inventory tracking lag between physical movement and system reconciliation.

The Safety-Stock Formula with Lead-Time Variance Arithmetic

FORMULA APPLICATION

$SS = Z \times \sqrt{((\bar{L} \times \sigma_d^2) + (\bar{d}^2 \times \sigma_{LT}^2))}$ | $ROP = (\bar{d} \times \bar{L}) + SS$

Critical SKU	Avg Daily Demand ($\bar{d}$)	Demand Std Dev (σ_d)	Avg Lead Time ($\bar{L}$ days)	LT Std Dev (σ_{LT} days)	Service Factor (Z)	Calculated Safety Stock (SS units)	Reorder Point (ROP units)
SKU-101 (Inverter)	120 units	18 units	45 days	14 days	2.33 (99%)	**3,924 units** (~33 days)	**9,324 units**
SKU-202 (Die-Cast)	250 units	35 units	14 days	3 days	2.33 (99%)	**1,788 units** (~7 days)	**5,288 units**
SKU-303 (Resin Pellets)	500 kg	60 kg	30 days	8 days	2.33 (99%)	**9,376 kg** (~19 days)	**24,376 kg**
SKU-404 (OLED Board)	80 units	15 units	60 days	20 days	2.33 (99%)	**3,742 units** (~47 days)	**8,542 units**
[Field Log Line]					2.33 (99%)		

Buffer Stock Positioning Allocation (Decoupling & VMI)

BUFFER POSITIONING

Inventory held at the wrong node creates transit delay during corridor disruption. Position buffers strategically:

SKU Group	Total Target Buffer	Regional DC (In-Market)	Strategic Decoupling Node	Vendor-Managed (VMI)
SKU-101 (Inverter)	4,000 units (33 days)	2,000 units (Central DC)	1,000 units (Sub-assembly decoupling)	1,000 units (On-site consignment)
SKU-202 (Die-Cast)	1,800 units (7 days)	800 units (Local Warehouse)	500 units (Raw casting staging)	500 units (Supplier VMI near plant)
SKU-404 (OLED Board)	3,800 units (47 days)	2,500 units (Bonded warehouse)	800 units (Tested sub-boards)	500 units (Consignment stock)
[Field SKU Group]				

VENDOR-MANAGED INVENTORY (VMI) & BALANCE SHEET RULE

VMI guarantees physical availability at a facility adjacent to your production plant with financial payment triggered only upon withdrawal. Working capital stays off your balance sheet while the supply chain RTO is protected against international freight disruption. Recalculate variance quarterly or whenever transit corridors degrade.