Unified Consolidation Methodology

Ideal Supplier Count + Dominant Supplier Concentration Framework

⚠️ **COMMODITY-SPECIFIC ANALYSIS FRAMEWORK**

⚠️ **CRITICAL: All Measures Are Calculated PER COMMODITY**

This methodology analyzes ONE COMMODITY AT A TIME, not your entire portfolio.

- **Steel Commodity:** Analyze steel suppliers, steel spend, steel concentration
- **Electronics Commodity:** Analyze electronics suppliers, electronics spend, electronics concentration
- **Chemicals Commodity:** Analyze chemicals suppliers, chemicals spend, chemicals concentration
- **Each commodity gets its own separate analysis and consolidation index**

Complete Integrated Formula (Per Commodity)

Master Consolidation Opportunity Index:

Consolidation Index = Supplier Gap Factor × Concentration Adjustment Factor × Scale Factor

Where (ALL FOR ONE SPECIFIC COMMODITY):
– Supplier Gap Factor = (Current Suppliers – Ideal Suppliers) / Ideal Suppliers

- Concentration Adjustment Factor = 1 - (Largest Supplier Share)^2
- Scale Factor = Log(Total Spend in $K) / 6.9 (normalizes to $1M baseline)

Component Calculations (All Commodity-Specific):

1. Ideal Supplier Count for THIS COMMODITY (with rounding):

Raw Ideal = 1 + Log_{10}(THIS COMMODITY's Spend in $M)

Ideal Suppliers = Max(1, Round(Raw Ideal))

Rounding Rules:

- 0.1 to 1.4 → Round down to 1
- 1.5 to 2.4 → Round down to 2
- 2.5 to 3.4 → Round down to 3
- 3.5+ → Cap at 3 (maximum practical limit)

2. Largest Supplier Share WITHIN THIS COMMODITY:

Largest Share = Largest Supplier's Spend on THIS COMMODITY / Total THIS COMMODITY Spend

3. Scale Factor for THIS COMMODITY:

Scale Factor = Log(THIS COMMODITY's Total Spend in $K) / 6.9

(Where 6.9 = Log(1,000) normalizes to $1M baseline)

Step-by-Step Methodology (Commodity-Specific)

Step 1: Calculate Ideal Supplier Count for THIS COMMODITY

Formula with Rounding Logic:

Raw Ideal = 1 + Log_{10}(THIS COMMODITY's Spend ÷ 1,000,000)

Ideal Count = Max(1, Round(Raw Ideal))

Examples for Different Commodities:

- **Steel Commodity $100K:** Raw = 1 + Log_{10}(0.1) = 0 → **Steel Ideal = 1**

- **Electronics Commodity $3M:** Raw = 1 + Log_{10}(3) = 1.48 → **Electronics Ideal = 1**

- **Chemicals Commodity $10M:** Raw = 1 + Log_{10}(10) = 2.0 → **Chemicals Ideal = 2**

Step 2: Calculate Supplier Gap Factor for THIS COMMODITY

Formula:

Gap Factor = (Current Suppliers for THIS COMMODITY - Ideal Suppliers) / Ideal Suppliers

Example - Steel Commodity:

- Current steel suppliers: 5

- Ideal steel suppliers: 2

- Gap Factor = (5-2)/2 = 1.5

Step 3: Calculate Concentration Adjustment Factor for THIS COMMODITY

Formula:

$$\text{Concentration Factor} = 1 - (\text{Largest Supplier Share in THIS COMMODITY})^2$$

Example - Steel Commodity:

- Total steel spend: $3,200K

- Largest steel supplier: $1,200K

- Steel concentration = $1,200K / $3,200K = 37.5%

- Factor = $1 - (0.375)^2 = 0.859$

Step 4: Calculate Scale Factor for THIS COMMODITY

Formula:

$$\text{Scale Factor} = \text{Log}(\text{THIS COMMODITY's Total Spend in \$K}) / 6.9$$

Example - Steel Commodity:

- Steel spend: $3,200K

- Scale Factor = Log(3,200) / 6.9 = 8.07 / 6.9 = 1.17

Step 5: Calculate Final Index for THIS COMMODITY

Master Formula:

$$\text{THIS COMMODITY's Consolidation Index} = \text{Gap Factor} \times \text{Concentration Factor} \times \text{Scale Factor}$$

Steel Example:

$$\text{Steel Index} = 1.5 \times 0.859 \times 1.17 = 1.51$$

Comprehensive Worked Examples (Each for ONE Commodity)

Example 1: Steel Commodity Analysis ($3.2M)

Commodity: Steel Only **Given Steel Data:**

- Total Steel Spend: $3,200K
- Current Steel Suppliers: 5
- Largest Steel Supplier: $1,200K (37.5% of steel spend)

Steel Analysis Steps:

Step 1: Steel Ideal Supplier Count

$$\text{Raw Ideal} = 1 + \text{Log}_{10}(3.2) = 1 + 0.505 = 1.505$$
$$\text{Steel Ideal Count} = \text{Round}(1.505) = 2 \text{ suppliers}$$

Step 2: Steel Supplier Gap Factor

$$\text{Steel Gap Factor} = (5 - 2) / 2 = 1.5$$

Step 3: Steel Concentration Adjustment Factor

$$\text{Steel Concentration Factor} = 1 - (0.375)^2 = 1 - 0.141 = 0.859$$

Step 4: Steel Scale Factor

Steel Scale Factor = Log(3,200) / 6.9 = 8.07 / 6.9 = 1.17

Step 5: Steel Final Index

Steel Consolidation Index = 1.5 × 0.859 × 1.17 = 1.51

Steel Interpretation: High consolidation opportunity - move from 5 to 2 steel suppliers

Example 2: Electronics Commodity Analysis ($2.1M)

Commodity: Electronics Only **Given Electronics Data:**

- Total Electronics Spend: $2,100K

- Current Electronics Suppliers: 4

- Largest Electronics Supplier: $890K (42.4% of electronics spend)

Electronics Analysis Steps:

Step 1: Electronics Ideal Supplier Count

Raw Ideal = 1 + Log_{10}(2.1) = 1 + 0.322 = 1.322
Electronics Ideal Count = Round(1.322) = 1 supplier

Step 2: Electronics Supplier Gap Factor

Electronics Gap Factor = (4 – 1) / 1 = 3.0

Step 3: Electronics Concentration Adjustment Factor

Electronics Concentration Factor = 1 - (0.424)² = 1 - 0.180 = 0.820

Step 4: Electronics Scale Factor

Electronics Scale Factor = Log(2,100) / 6.9 = 7.65 / 6.9 = 1.11

Step 5: Electronics Final Index

Electronics Consolidation Index = 3.0 × 0.820 × 1.11 = 2.73

Electronics Interpretation: High consolidation opportunity - move from 4 to 1 electronics supplier

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Multi-Commodity Portfolio Application

How to Apply Across Your Commodity Portfolio:

Step 1: List All Commodities

- Steel, Electronics, Chemicals, Plastics, Services, etc.

Step 2: Analyze Each Commodity Separately

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FOR EACH Commodity:
    Calculate Ideal Supplier Count for THIS commodity
    Calculate Gap Factor for THIS commodity
    Calculate Concentration Factor for THIS commodity
    Calculate Scale Factor for THIS commodity
    Calculate Final Index for THIS commodity
```

Step 3: Rank Commodities by Index

- Highest index = highest consolidation priority

- Each commodity gets independent recommendation

Step 4: Implement Commodity-Specific Actions

Example Multi-Commodity Results:

Commodity	Spend	Current Suppliers	Ideal	Index	Priority	Action
Electronics	$2,100K	4	1	2.73	HIGH	4→1 suppliers
Steel	$3,200K	5	2	1.51	MEDIUM	5→2 suppliers
Chemicals	$5,200K	3	2	0.45	LOW	3→2 suppliers
Energy	$8,900K	2	3	-0.33	MONITOR	Consider adding supplier

Decision Framework (Per Commodity)

Index Interpretation Thresholds:

Index Range	Priority Level	Action Required	Typical Scenario
>3.0	CRITICAL	Major consolidation needed for this	Small spend, many suppliers

Index Range	Priority Level	Action Required	Typical Scenario
		commodity	
2.0-3.0	HIGH	Aggressive consolidation for this commodity	Medium spend, too many suppliers
1.0-2.0	MEDIUM	Selective consolidation for this commodity	Large spend, moderate excess
0.3-1.0	LOW	Minor optimization for this commodity	Near optimal structure
<0.3	MONITOR	Maintain or add suppliers for this commodity	Well-managed or over-consolidated

Implementation Priority Matrix (Commodity-Level):

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FOR EACH COMMODITY:
  IF Index > 2.5 AND Spend > $500K:
      → Immediate action required for this commodity

  ELIF Index > 1.5 OR Spend > $2M:
      → High priority for this commodity next quarter

  ELIF Index > 0.8:
      → Medium priority for this commodity when resources available

  ELSE:
      → Monitor this commodity and maintain current structure
```

Quality Control Checks (Per Commodity)

Sanity Check Rules:

1. **Minimum Supplier Rule:** Never recommend <1 supplier for any commodity spend >$100K

2. **Maximum Concentration Rule:** Flag if largest supplier would exceed 90% of commodity spend

3. **Market Reality Check:** Consider if ideal count is achievable given supplier base for this commodity

4. **Risk Threshold:** Flag high-priority commodities with Index >2.0

Validation Metrics (Per Commodity):

- **Gap Factor validity:** Should be between -1.0 and +10.0

- **Concentration Factor validity:** Should be between 0.0 and 1.0

- **Scale Factor validity:** Should be between 0.5 and 2.0

- **Final Index validity:** Should be between 0.0 and 8.0

Practical Implementation

Data Requirements (For Each Commodity):

1. Total commodity spend (e.g., total steel spend)

2. Number of current suppliers for this commodity

3. Individual supplier spends on this commodity

4. Commodity criticality classification (optional)

Workflow:

1. **Extract Data by Commodity:** Group all spend data by commodity type

2. **Run Analysis per Commodity:** Use methodology for each commodity separately

3. **Rank Results:** Sort commodities by consolidation index

4. **Implement by Priority:** Start with highest-index commodities

Reporting Format:

- **Commodity Name:** Steel, Electronics, etc.

- **Index value with interpretation:** 1.51 = Medium Priority

- **Current vs. ideal supplier count:** 5 → 2 suppliers

- **Largest supplier concentration level:** 37.5% market share

- **Recommended consolidation targets:** Specific to this commodity

- **Implementation timeline:** Based on commodity priority

This unified methodology provides both the mathematical rigor for commodity-level opportunity identification and the business logic for practical implementation, ensuring each commodity is optimized according to its specific scale and market dynamics.