Supply Chain Rationalization and Network Design

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Introduction

When the Customer demands the lowest price, product variety and immediate delivery...

there is great business risk

...for the Factory and the Distributor to supply such a competitive solution.

Here is how it can be done.

Manage Business Risk With...

- A Solid Network Design
  Based on competitive lead time+ cost+ inventory.

- Product-Customer Rationalization
  Based on contribution margin.

- Supply Base Rationalization
  Based on commodity sourcing cost+ complexity.
Supply Chain Architecture

![Diagram showing supply chain architecture]


Ten Step Network Design: Deliver

1. Define the Market Requirement
2. Identify All Delivery Channels
3. Define All Product Families
4. DELIVER: Locate the Distribution Center(s)

Example: 1- Battery Backup for Server Computers in Information Centers
   2A- US Corporate Accounts; 2B- European Value-Added Resellers
   3A- 250 Watt; 3B- 500 Watt; 3C- 1,000 Watt
   4- Piggyback Computer Distribution in US and Europe....$14
Ten Step Network Design: Make/Source

5. **Determine the Product Composite BOM**

6. **MAKE: Locate the Factory**
   - +Cost
   - +Inventory

7. **SOURCE: Locate the Supply Base**

8. **Add Inbound/Outbound Logistics**
   - Total Cost
   - +Inventory

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Example: 5/6- Contract Manufacturer in Shenzhen, China....$14+$238
5/7- Common Battery Cells, Front/Rear Frame, Board Assemblies
8- Ocean Freight Lowest Cost for Weight and Volume....$252+$6

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Ten Step Network Design: Plan

9. **PLAN: Define the Push/Pull Boundary**
   - Total Delivery
   - LT
   - Total Cost
   - Total Inventory

10. **PLAN: Identify Network Capacity Constraint**
    - End

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Example: 9- Cycle Stock at the Distribution Center
10- Supplier of Front Frames
Question A: A supply chain network should be redesigned when...?

1. Two companies merge
2. A customer decides to outsource an internal process
3. A new product line is introduced
4. Company sales go international

Question B: Which is the more important design criteria: Total Cost or Total Inventory?

1. Two companies merge
2. A customer decides to outsource an internal process
3. A new product line is introduced
4. Company sales go international

Answer A: Supply chain network design should be evaluated under each scenario.

Answer B: Total Cost is an income statement item reflected externally in product pricing; Total Inventory is a balance sheet item with target levels set internally.
Example Delivery Channels

1. "Factory Direct"
   - Factory
   - Customer

2. Value-Added Reseller
   - Factory
   - Customer
   - Value-Added Reseller
   - Customer

3. Wholesale Distributor
   - Factory
   - Customer
   - Wholesale Distributor
   - Retail Store
   - Customer

▲ = Product Inventory

Product Postponement

- The Factory builds and ships a generic assembly
- The Distribution Center stocks unique, low cost parts
- The Distribution Center completes the product build after receiving the Customer's order
1st Pass DC Selection Criteria

- Located close to the market for delivery lead time
- Good capacity match with factory at competitive cost
- Low cost inbound and outbound logistics
- Product postponement capability

Product Variety Driven By...

- High volume and high mix demand
- Flat and deep bills of materials
- Short and long product life cycles
- Stable and continuously changing designs
Matching Capacity To Seasonality

From high volume, quick season apparel...

To high mix, short life cycle electronics...

1st Pass Factory Selection Criteria

- A competitive labor rate in core process
- Stable, educated workforce
- Low cost inbound and outbound logistics
- Good capacity match with distribution
Inbound/Outbound Logistics

Airfreight

Make

Ocean Freight

Deliver

Competitive Delivery Lead Time Defined By Inventory Location

Forecast

Order

Push/Pull Boundary

Push/Pull Boundary

BTS Delivery LT

BTO Delivery LT

Customer
Contribution Margin

Contribution Margin = 
Sales Revenue - Variable Costs

CM = + Sales
- Cost Of Goods Sold
- Sales Commission
- Delivery Costs

Product-Customer Rationalization

<table>
<thead>
<tr>
<th>Product Customer</th>
<th>B</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$358,000</td>
<td>$100,000</td>
<td>$92,500</td>
<td>$90,100</td>
</tr>
<tr>
<td>Variable Costs</td>
<td>$267,900</td>
<td>$72,000</td>
<td>$88,500</td>
<td>$64,900</td>
</tr>
<tr>
<td>COGS</td>
<td>$4,101</td>
<td>$800</td>
<td>$2,400</td>
<td>$901</td>
</tr>
<tr>
<td>Commission</td>
<td>$5,750</td>
<td>$700</td>
<td>$3,000</td>
<td>$850</td>
</tr>
<tr>
<td>Delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>$277,751</td>
<td>$73,500</td>
<td>$93,900</td>
<td>$66,651</td>
</tr>
<tr>
<td>Contribution Margin</td>
<td>$80,249</td>
<td>$26,500</td>
<td>($1,400)</td>
<td>$23,449</td>
</tr>
<tr>
<td>Percentage</td>
<td>26.5%</td>
<td>-1.5%</td>
<td>26.0%</td>
<td>42.0%</td>
</tr>
</tbody>
</table>
Question C: Should Product 7 be discontinued?

<table>
<thead>
<tr>
<th>Product</th>
<th>Customer</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>15</td>
<td>24.3%</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>-3.2%</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
<td>2.1%</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
<td>17.5%</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>10.8%</td>
</tr>
</tbody>
</table>

Question D: What are some possible reasons for Product 3 to have a lower CM with Customer 24?

Answer C: No, Product 7 is sold to Customer 15 who also buys Product 4 at the highest CM.

Answer D: Product 3 may have a different logistics cost and commission structure with Customer 24 than with Customer 19.
Supply Base Rationalization

1. Develop a Composite BOM Across All Products

2. Supplier 1 Capability
   Supplier 2... Capability
   Supplier N Capability

3. Map Supply Base Geography

4. Compute Factory Landed Cost

5. Determine Stranded Inventory Cost

6. Commodity A Alternative Supply Costs
   Commodity B... Alternative Supply Costs

7. Rationalize Supply Base Commodity by Commodity

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1-Develop A Composite BOM

Product BOM #1 Product BOM #2 Product BOM #3

Composite BOM Commodity/ SKU/ Supplier/ Location
A1
A2
A3
B1
B2
B3
B4
B5
C1
C2
2-Determine Supplier Capability

<table>
<thead>
<tr>
<th>Supplier K...</th>
<th>SKU B1</th>
<th>Capability 2</th>
<th>Capability 3</th>
<th>SKU B4</th>
<th>Capability 5</th>
<th>Capability 7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Currently sources B1</td>
<td>Could source B2</td>
<td>Could source B3</td>
<td>Currently sources B4</td>
<td>Could source B5</td>
<td>Cannot source B6</td>
</tr>
</tbody>
</table>

3-Map Supply Base Logistics

[Map showing supply chain logistics with supplier B1, B2, B3, B4, B5, B6, and B7 connected by routes labeled Supplier Motor Freight and Milk Run Supplier, with Factory and Supplier B4 marked as key points.]
10/22/2012

**4-TOTAL COST PER SUPPLIER**

- **Starting Price**
  - Increased Volume
  - Logistics Cost
  - Stranded Inventory Cost
  - Capability Cost

**5-EVALUATE STRANDED INVENTORY COST**

- Inventory becomes "stranded" when it is disconnected from all demand.
  ------
  - New parts for new products not yet structured.
  - Product structures discontinued by ECO.
  - End-of-life zero demand.
  ------
  - Stranded inventory becomes a financial write-off.
6-Identify Sourcing Alternatives

Supplier 1
- SKU B1
- SKU B2
- Capability 3
- Capability 4
- Capability 5
- Capability 6

Supplier 2
- Capability 1
- Capability 2
- SKU B4
- Capability 6
- Capability 7

...Supplier K...
- SKU B1
- Capability 2
- Capability 3
- SKU B4
- Capability 5

...Supplier N
- Capability 2
- SKU B3
- Capability 4
- SKU B5

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7-Rationalize By Commodity

Supplier 1
- SKU B1
- Capability 3
- Capability 4
- Capability 5
- Capability 6

Supplier 2
- Capability 1
- Capability 2
- SKU B4
- Capability 6
- Capability 7

...Supplier K...
- SKU B1
- Capability 2
- Capability 3
- SKU B4
- Capability 5

...Supplier N
- Capability 2
- SKU B3
- Capability 4
- SKU B5

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<table>
<thead>
<tr>
<th>All Items</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capability Cost</td>
<td>4$</td>
<td>3$</td>
<td>3$</td>
<td>1$</td>
</tr>
<tr>
<td>Logistics Cost</td>
<td>1$</td>
<td>1$</td>
<td>1$</td>
<td>1$</td>
</tr>
<tr>
<td>Inventory Cost</td>
<td>2$</td>
<td>1$</td>
<td>1$</td>
<td>1$</td>
</tr>
<tr>
<td>Total Cost</td>
<td>7$</td>
<td>5$</td>
<td>5$</td>
<td>5$</td>
</tr>
</tbody>
</table>
Summary

- Evaluate supply chain network design based on delivery lead time, cost and inventory for
  - Mergers/ Spin-offs
  - Outsourcing/ In-sourcing
  - Product Introductions/ Obsolescence

- Rationalize product-customer pairs based on contribution margin.

- Rationalize the supply base on the cost and complexity to source each commodity.