A Strategy consulting firm with unique depth in operations

Bauer Supply Chain Spring 2015 Symposium
Supply Chain Complexity

March 6, 2015
Agenda

• Complexity facing companies today

• Quantifying the impact of complexity

• Eliminating and managing complexity
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• Eliminating and managing complexity
The world has changed!

Pre-Industrial Age

“Individual productivity”

Dominated by variable costs

Industrial Age

“Economies of Scale”

Dominated by fixed costs

Post-Industrial Age

“Complexity”

Dominated by complexity costs
Complexity and its impacts grow exponentially

Characteristics of Complex Systems

1. Non-linear reactions
2. Emerging properties
3. Feedback loops
4. Unknown interactions

*These characteristics make Complex Systems almost impossible to predict and control*
Complexity is stretching companies’ capabilities

TECHNOLOGY IS MORE COMPLEX

PRODUCTS AND SERVICES MORE COMPLEX

PROCESSES MORE COMPLEX

ORGANIZATIONS MORE COMPLEX

REGULATIONS MORE COMPLEX

MARKETS MORE COMPLEX
Many companies are passing a complexity threshold

Costs and operational risk grow exponentially with complexity

An increasing number of companies are here

Many companies are here

Few companies are still here

COST & RISK
(exponential growth)

VALUE
(diminishing returns)

Complexity
# Complexity impacts all aspects of your business

## Cost & Operations
- Hidden costs
- Exponential growth
- Cross subsidization
- Most products are unprofitable

## Business & Operational Risk
- Grows exponentially with complexity
- Cannot anticipate all points of failure

## Growth & Innovation
- Slows new product development
- Overwhelms customers
- Distracts sales force
Product, Process & Organization Complexity interact to drive higher costs & risk

The Complexity Cube

Product
Number of products and services you offer

Process
Number of processes, steps, handoffs, etc.

Organization
Number of assets, facilities, entities, partners, etc.

The cube visualizes the interplay between Product, Process, and Organization:

- **Value add**: Represents the core activities that add value to the product or service.
- **Non-value add**: Includes activities that do not contribute directly to the value of the product or service.

By understanding and optimizing these three dimensions, organizations can mitigate complexity and associated costs and risks.
Complexity impacts all aspects of supply chain performance

**Complexity-driven supply chain challenges**

- Bloated Inventories
- More Supply Chain Disruptions
- Poor S&OP Accuracy
- Slower Response Times
- Increased NVA Cost/Overhead
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How do you allocate costs?

By “Volume”

<table>
<thead>
<tr>
<th>Total cost</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit cost</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

By “Item”

<table>
<thead>
<tr>
<th>Total cost</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

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<tr>
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</tbody>
</table>
Complexity costs follow a square root of volume relationship

- **Cost** rises with volume but not as much as in “by volume” approach
- **Unit cost** drops off with volume but not as much as in “by item” approach

*Most NVA costs fall in between “by volume” and “by unit” extremes*

*We see the SQRT relationship over and over*
Cost allocation methods

**By actual costs**
- Best approach
- But not always practical (e.g., activity-based costing)

**By ‘volume’**
- Cost allocated in proportion to either # units, revenue, cost, etc.
- I.e., “Peanut butter spread”

**By ‘SQRT vol.’**
- In between “by volume” and “by item” methods
- Higher-vol. items receive greater aggregate cost
- Lower-vol. items receive greater unit cost

**By ‘item’**
- Costs divided equally between products, stores, regions, etc. regardless of volume

• NVA/complexity costs follow the “SQRT of volume” relationship
• Without this tool, most companies allocate these costs using the “by volume” method, leading to over-costing of high-volume items and under-costing of low-volume items
**EXAMPLE: Square root costing**

**Scenario:**
- Product “A”: volume of 1 unit
- Product “B”: volume of 50 units
- Total cost to allocate = $50

**Allocation method:**
- “By Volume”
- “By SQRT Vol.”
- “By Item”

**“By Volume”**

<table>
<thead>
<tr>
<th>Prod A</th>
<th>Prod B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1</td>
<td>$1</td>
</tr>
</tbody>
</table>

**“By SQRT Vol.”**

<table>
<thead>
<tr>
<th>Prod A</th>
<th>Prod B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6</td>
<td>$0.88</td>
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</tbody>
</table>

**“By Item”**

<table>
<thead>
<tr>
<th>Prod A</th>
<th>Prod B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$25</td>
<td>$0.50</td>
</tr>
</tbody>
</table>

“In between” is not simply the average of the two extremes.
Only complexity-driven costs are allocated using square root costing

Traditional Allocation Categorization

Variable (α Vol.)

Fixed

Variable (α Vol.)

SQRT costs

Fixed

“Square Root” Allocation Categorization

- Unmasks cross-subsidization
- Corrects for under-costing small volume items/activities
- Corrects for over-estimating potential for fixed cost leverage
Reallocating costs

Annual Costs ($M)

Allocate only those costs driven by NVA complexity

<table>
<thead>
<tr>
<th>Component</th>
<th>Annual Costs ($M)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brewing Materials</td>
<td>1044</td>
<td>11%</td>
</tr>
<tr>
<td>Packaging Materials</td>
<td>3413</td>
<td>36%</td>
</tr>
<tr>
<td>Conversion Costs</td>
<td>1860</td>
<td>19%</td>
</tr>
<tr>
<td>Distribution</td>
<td>920</td>
<td>10%</td>
</tr>
<tr>
<td>Marketing Spend</td>
<td>1316</td>
<td>14%</td>
</tr>
<tr>
<td>Corporate SG&amp;A</td>
<td>1058</td>
<td>11%</td>
</tr>
<tr>
<td>Total Costs</td>
<td>9611</td>
<td>100%</td>
</tr>
</tbody>
</table>
The powerful impact of complexity cost allocation

% Operating Margin

- Typical standard costing
- Complexity-adjusted costing

Vol. (bbls):
- Budget: 12.5M
- Below Premium: 16.4M
- Premium: 44.3M
- Craft: 4.8M
- Average: 78.0M
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Complexity creates a vicious cycle

- Increased complexity
- Processes & people are added to improve
- Poor business results
- Loss of process control
- Poor execution

Vicious Complexity Cycle
.. But ultimately, mastering complexity requires a two-pronged approach

**QUESTION:**

Reduce amount of complexity?

- Brand elimination
- Product/service rationalization
- Geography or market rationalization

Material consolidation

- Vendor, dealer, distributor, supplier consolidation
- Management System

Operating model redesign

- Process flexibility
- Dynamic modeling
- High Reliability Culture

**ANSWER:**

- **Both**
- We do not live in a “plain vanilla” world (we need variety)
- Customers demand good prices (we need cost-competitiveness)
- But no real operation is lean enough to support infinite variety
Conclusion

• Complexity has become a key factor driving performance for many companies...

• ...but most companies are ill-prepared to identify and manage complexity in their operations

• Companies can better deal with increasing complexity by:
  – Understanding the sources of complexity and the impacts (cost & performance)
  – Eliminating NVA complexity and better managing necessary complexity