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Supply Chain Complexity

Huge inefficiencies result from complexity gaps
Supply Chain Complexity “Root Causes”

1. **Uncertainty**
   - Not knowing about future events
   - Not knowing about present status
   - Not knowing process

2. **Variability**
   - Requirement and/or resource changes over time

3. **Synchronization**
   - Matching requirements and/or resources with time

4. **Unity**
   - Dealing with indivisible products and/or resources

5. **Size**
   - Number of actions to perform or consider for performance

6. **Speed**
   - How quickly actions must be performed

7. **Diversity**
   - Differences among products and/or resources

Impact of Mega Trends on Complexity

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<th>Mega Trend</th>
<th>Uncertainty</th>
<th>Variability</th>
<th>Synchronization</th>
<th>Unity</th>
<th>Size</th>
<th>Speed</th>
<th>Diversity</th>
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Supply Chain Complexity Gaps

- Large complexity gaps are bad
  - Increased cost and risk
- Small complexity gaps are not necessarily good
  - Complexity is often decreased by increasing inefficiency in the supply chain
- Reducing complexity in one part of the supply chain often increases complexity in another
  - Example – delivery appointments
- Reducing complexity gaps often results in new complexity gaps
  - Example – decision technology
- Transforming complexity and/or complexity gaps may itself be complex
  - Understanding complexity is essential

Responding to Supply Chain Complexity

1. Strategic Visibility
2. Innovation
3. Integration
4. Information & Decision Technology
5. Executive ownership
Supply Chain Strategic Visibility

Profit

Where are we?

Where could we be?

What is the “net” value?

Optimized

What is our goal?

What has to be done?

Today

Time

For each logistics process (e.g. delivery to dealers)

Mapping the Supply Chain

Supplier → Plant → x-dock → Warehouse → Store

Logistics Functions
- Inventory
- Transportation
- Handling

Assessment
- Cost
- Interactions
- Decisions
- Complexity
Supply Chain Operations Reference (SCOR) model

- Decompose the supply chain into elemental logistics processes
- Quantify performance metrics and capture as-is state of each process
- Establish targets for each process based on best-in-class results
- Characterize the management practices and software solutions that result in best-in-class
  - Interactions between processes are ignored!

Innovation

- Wal-Mart ➔ Cross docking
- Southwest Airlines ➔ Only 737s
- Dell ➔ Build to order
- FedEx ➔ Hub and spoke

- Each innovation fundamentally transformed complexity!
Wallmart’s Cross-dock Network

- **Example**
  - Large retailer
  - Shipments from multiple suppliers to DCs
  - Less than truck load shipments

- **Possible networks**
  - All direct ships
  - Utilize cross docks

- **Hybrid**
  - Some via cross docks
  - Some direct
  - Some via multi stop

- **Both increase and decrease complexity to reduce cost**

Integration

- **Retail life cycle**
  - Lead time
  - Order quantity
  - Off shoring

Ref: Marshall Fisher
Sporting Goods - Reorder Quantity

- **Example**
  - Receipt and put away at store
  - Typically a fixed order quantity
  - Quantity may not fit shelf space
  - Often not a well defined process with little training
  - May cause lost sales of other products
  - Integrate
    - Order quantity
    - Order time
    - Ship frequency
    - Delivery time
    - Receipt process

Technology

**ERP**
- Transactions
- Value - automation
- CEO sale
- Complex IT & process installation
- Limited maintenance
- IT support
- Clerical users
- Few parameter changes

**SCP**
- Decisions
- Value - optimization
- VP sale
- Complex IT, process & logistics installation
- High maintenance
- IT & Logistics support
- Technical users
- Many parameter changes
Planning Technology

Decentralized
- People power
- Enhance with computing power

Centralized
- Computing power
- Enhance with people power

Optimization not obvious!
Example - Dedicated Delivery Fleet

Current Solution
10 Routes
2006 Miles

Optimized Solution
7 Routes
1345 Miles

- The only way to determine the value of optimization is by optimizing!
Current State of Planning/ Optimization Technology

- **Opportunity**
  - Large disparity between current practice and optimum
  - Excellent data and communication capability
  - New generation of computing technology
  - Decision technology can significantly mitigate complexity
  - Knowledge to create a “next generation” of decision technology

- **Challenges**
  - More complex supply chains require more complex decision technology
  - Spotty success with sophisticated decision technology
  - Decision technology requires some “rocket scientists”
  - Supply chain planning software vendors are struggling
  - The “next generation” of decision technology requires significant departures from the past

Computer/ Communications Technology

- **Computing evolution**
  - Mainframes (1960s)
  - PCs (1980s)
  - Client/server (1990s)
  - Internet centric (2000s)

- **Internet**
  - Ubiquitous access
  - Computer location irrelevant

- **Wireless**
  - Voice, data, GPS, RFID

- **How has computing/ communication impacted complexity?**
  - Better data, automated transactions, improved status
  - Dynamic data, few standards
Executive Ownership

- Supply chain complexity and logistics optimization can have a huge impact on the “bottom line”
- CEOs are rewarded for “bottom line” impact
- CEOs typically do not understand supply chain complexity or logistics
- Companies are not systematic and persistent about identifying opportunities
- Supply chain transformation champions are typically in operations
- Supply chain transformation has risks
- Operations are not adequately rewarded for assuming risk
- Must develop executive (CEO) ownership

Responding to Supply Chain Complexity

1. Strategic Visibility
   - What is your supply chain map?
   - How do you determine cost, risk and performance metrics for each of your logistics processes?
   - What are the root causes of complexity for each of your logistics process?
   - Which logistics process provide the biggest opportunities for improvement based cost, risk and complexity?

2. Innovation
   - Where are the opportunities for fundamental changes in supply chain design and logistics processes?

3. Integration
   - Where can better integration between your logistics processes improve performance?

4. Technology
   - Where are the opportunities for improved technology for transaction automation and logistics planning

5. Executive Ownership
   - What is required to obtain executive ownership?