The Rise of the VUCA World

Volatile

The frequency and severity of disruptions is increasing. “When” not “if”.
Uncertain

It has become increasingly difficult to predict what will happen.
The three truths about forecasting:
1. Forecasts start out wrong
2. The longer the forecasted time range the higher the error rate
3. The more detailed the forecast the higher the error rate

Complex

Today our supply chains have more connections and interdependencies leading to:
1. Elongation – cumulative lead times have extended as we source and sell globally
2. Fragmentation – many more nodes and inputs makes effectively managing integration much more difficult
3. Fragility – even small initiating events can have devastating effects
Ambiguous

It is becoming more and more difficult to tell what is happening. Supply chains are drowning in data but starved for relevant information.

VUCA is the “New Normal” for Supply Chain

<table>
<thead>
<tr>
<th>Supply Chain Characteristics</th>
<th>1965</th>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain Complexity</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Product Life Cycles</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>Customer Tolerance Times</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>Product Complexity</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Product Customization</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Product Variety</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Long Lead Time Parts</td>
<td>Few</td>
<td>Many</td>
</tr>
<tr>
<td>Forecast Accuracy</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Pressure for Leaner Inventories</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Transactional Friction/Customer Tolerance</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
The Need for Resilience

*Resilience: The ability to maintain or restore system equilibrium through or after large shocks.*

But how to build a resilient supply chain?
Is there something to focus on?
Is there a blueprint?

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Flow is THE Lever for ROI

\[
\Delta \text{Flow} \rightarrow \Delta \text{Cash Velocity} \rightarrow \Delta \left( \frac{\text{Net Profit}}{\text{Investment}} \right) \rightarrow \Delta \text{ROI}
\]

Management Accounting

Flow is what is managed. Cost is the outcome of that management.

Flow and Cost

Unitized cost calculations are based on past activity within a defined period. When things flow well through a defined period costs are controlled.

\[
\Delta \text{Cost} \rightarrow \Delta \text{Cash Velocity} \rightarrow \Delta \left( \frac{\text{Net Profit}}{\text{Investment}} \right) \rightarrow \Delta \text{ROI}
\]

Cost was NEVER intended to be a decision driver, its creation was to ensure transparent and consistent reporting to shareholders and tax authorities!

Flow is the rate at which a system converts material to product required by a customer.

Cash velocity is the rate of net cash generation; sales dollars minus truly variable costs (aka contribution margin) minus period operating expense.

Net profit/investment the equation for ROI
Conventional Inventory Management Effects

We know there are two universal points with regard to inventory.

Between these points there is an optimal range to maintain.

Most companies exhibit a “bi-modal distribution” – most of the inventory is either too low or too high.

With every MRP run an oscillation effect often occurs in which inventory quickly moves from one distribution to the other.

90% of companies report this issue!
Demand Driven MRP

A method to model, plan and manage supply chains to protect and promote the flow of relevant information and materials. DDMRP uses strategic decoupling points to drive supply order generation and management throughout a supply chain.

Position, Protect and Pull

The Five Components of DDMRP

<table>
<thead>
<tr>
<th>Position</th>
<th>Protect</th>
<th>Pull</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Strategic Decoupling</td>
<td>Buffer Profiles and Levels</td>
<td>Dynamic Adjustments</td>
</tr>
<tr>
<td>4</td>
<td>Pull 5</td>
<td>Demand Driven Planning</td>
</tr>
</tbody>
</table>
Position – MRP versus DDMRP

MRP (Everything Coupled)

- Coupled System Lead time = 8 weeks

- Part Demand Information (Forecast and/or Historical Usage)
- Average Daily Usage (ADU)
- Part/SKU Lead Time
- Part/SKU Order Multiple
- Buffer Profile Assignment

- Critical Difference:
  MRP was never designed to decouple! It makes everything dependent forcing longer planning horizons and variability accumulation.

DDMRP (Strategically Decoupled)

- Lead Time = 4 weeks
- Lead Time = 3 weeks
- Lead Time = 1 week

- Part Demand Information (Forecast and/or Historical Usage)
- Average Daily Usage (ADU)
- Part/SKU Lead Time
- Part/SKU Order Multiple
- Buffer Profile Assignment

- Critical Difference:
  MRP was NOT designed to manage stock positions – it was designed to be the perfect make to order calculator.

MRP nets to zero.
DDMRP NEVER nets to zero!
Protect – Dynamic Buffer Adjustment

Recalculated Adjustments
Buffer levels flex as Average Daily Usage (ADU) is updated.

Demand Adjustment Factors
Buffers are intentionally flexed up or down in anticipation of planned events or seasons.

Critical Difference:
Most conventional safety stock and reorder point positions are static NOT dynamic.

The Net Flow Equation
Questions every planner cares about each day.

What is coming to me? What do I have? What demand do I need to fulfill immediately? What future demand is relevant?

Buffer Status and Supply Order Generation occurs through a DAILY application of the “Net Flow Equation”.

On-Hand + Open Supply - Qualified Sales Order Demand

Supply order issued for up to the top of the buffer
### Pull – DDMRP Execution

#### Easy to Interpret Signals on Open Supply Priorities

<table>
<thead>
<tr>
<th>Order #</th>
<th>On-Hand Buffer Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO 819-87</td>
<td>27% (RED)</td>
</tr>
<tr>
<td>WO 832-41</td>
<td>42% (RED)</td>
</tr>
<tr>
<td>WO 211-72</td>
<td>88% (YELLOW)</td>
</tr>
</tbody>
</table>

**Critical Difference:**

- **MRP** = Priority by due date
- **DDMRP** = Priority by buffer status

<table>
<thead>
<tr>
<th>Order #</th>
<th>Order Type</th>
<th>Due Date</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO 12379</td>
<td>MTO</td>
<td>May - 12</td>
<td>SuperTech</td>
</tr>
<tr>
<td>MO 12401</td>
<td>MTS 12%</td>
<td>May - 14</td>
<td>Internal</td>
</tr>
<tr>
<td>MO 12465</td>
<td>MTS 27%</td>
<td>May - 12</td>
<td>Internal</td>
</tr>
<tr>
<td>MO 12367</td>
<td>MTS 53% RED</td>
<td>May - 12</td>
<td>Internal</td>
</tr>
<tr>
<td>MO 12411</td>
<td>MTS 61% YELLOW</td>
<td>May -16</td>
<td>Internal</td>
</tr>
</tbody>
</table>

#### Say Goodbye to the Bi-Modal Distribution

- **DDMRP** is proven to allow companies to plan and execute in the optimal range at strategically chosen points!

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The Demand-Driven and Customer-Centric Operating Model delivers transformational performance improvements

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Life Sciences</th>
<th>Chemicals</th>
<th>Consumer Packaged Goods</th>
<th>Industrial Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory reduction (percent)</td>
<td>-32%</td>
<td>-49%</td>
<td>-26%</td>
<td>-38%</td>
<td>-20%</td>
</tr>
<tr>
<td>Service level increase (points)</td>
<td>13%</td>
<td>15%</td>
<td>7%</td>
<td>2%</td>
<td>17%</td>
</tr>
<tr>
<td>Lead time reduction (percent)</td>
<td>-22%</td>
<td>-25%</td>
<td>-12%</td>
<td>-7%</td>
<td>-60%</td>
</tr>
</tbody>
</table>

BIC – Best in Class  Source: CAMELOT project experience, Demand Driven Institute, FAPICS

Demand Driven Adaptive Enterprise Model

Model Configuration  Business Plan Parameters  Market Driven Innovation  Model Projections, Innovation & Strategic Recommendations

Demand Driven Operating Model  Demand Driven S&OP  Adaptive S&OP

Actual Demand  Variance Analysis

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Reconciling the DDMRP with S&OP

- DDMRP allows for a single forecasted number to automatically convert to a range of capability
- This range of capability can then be compared with the range of the forecast to sense whether the capability range is sufficient
- If demand is higher, the buffers have safety
- If demand is lower stock exposure is limited
- If the range is insufficient then adjustments can be considered for the model through Master Settings

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