Supply Chain Theory and Projections for COVID-19 Spell Volatility Ahead

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Outline

- Background
- Demand changes
- Supply changes
- Supply chain structural changes
- Supply chain strategy theory
- My predictions
- The Centre and exec programme
- My wish list for government
Pre-COVID-19: The collective insights from 400 Supply Chain Executives surveyed by IBM identified five major challenges that comprise the Chief Supply Chain Officer (CSCO) agenda.

1. **SUPPLY CHAIN VISIBILITY**
   - 70%
   - Supply chain visibility is inhibited by a lack of capabilities and an unwillingness to collaborate.

2. **COST CONTAINMENT**
   - 55%
   - Fighting integral costs as such as might be futile, but being flexible can identify cost savings elsewhere.

3. **INCREASING CUSTOMER DEMANDS**
   - 56%
   - Customers have increased demand for more: right product, right place, right time, right price, sooner.

4. **GLOBALISATION**
   - 43%
   - Lead times, delivery, and quality are top challenges, but overall globalisation has been a positive boon for the leaders.

5. **RISK MANAGEMENT**
   - 60%
   - Process, data, & technology are identified as the roadblocks to good risk management, yet they are the key enablers.

*Based on responses of “to a very great extent” and “to a significant extent”*
Pre-COVID: Where Top Companies are Investing

- Cost optimization: 80% Visionaries, 57% Other companies
- Customer collaboration: 76% Visionaries, 52% Other companies
- Supply chain visibility: 75% Visionaries, 37% Other companies
- Demand management: 75% Visionaries, 73% Other companies
- Sourcing, collaboration and integration: 72% Visionaries, 53% Other companies
- Business intelligence and analytics: 69% Visionaries, 60% Other companies
- Inventory optimization: 68% Visionaries, 55% Other companies
- Network optimization: 68% Visionaries, 31% Other companies
- Sales and operations planning: 61% Visionaries, 43% Other companies
- Sustainability strategies and operations: 62% Visionaries, 60% Other companies
- Risk management: 55% Visionaries, 35% Other companies
- Performance management: 52% Visionaries, 55% Other companies
NZ Export Profile

Demand Changes

- Decreases
  - Nationally during lockdown
  - Travel dependent services – tourism and education
  - Internationally for nice-to-haves (e.g., lobster)

- Increases
  - Stockpiling
  - Perception of safety?
  - Supply shocks elsewhere

- Other
  - Home versus workplace consumption
The “Bullwhip Effect” in Supply Chains - Illustration

- Consumer Sales
- Retailer’s Order to Wholesaler
- Wholesaler’s Orders to Manufacture
- Manufacturer’s Orders to Supplier
Growth of Expected Time in System

![Graph showing the growth of expected time in system with labels for different utilization rates C2[i] + C2[p] = 0.5, C2[i] + C2[p] = 1.5, and C2[i] + C2[p] = 4.]
Supply Changes

- Suppliers not working
- Transport disruptions
- Social distancing leading to decreased capacity in production
- Closed plants, missing workforce
Lean Production: Reduce Inventory

- Scrap
- Vendor delinquencies
- Change orders
- Design backlogs
- Decision backlogs
- Machine downtime
- Engineering design redundancies
- Work in process queues (banks)
- Paperwork backlog
- Inspection backlogs
Layers of Protection Against Supply Chain Risk

- **Buffering**: Maintaining excess resources (inventory, capacity, time) to cover for fluctuations in supply or demand
- **Pooling**: Sharing buffers to cover multiple sources of variability (e.g., demand from different markets)
- **Contingency planning**: Establishing a preset course of action and “virtual buffers” for an anticipated scenario
- **Crisis management**: Generating responses to events for which buffers (individual or pooled) and contingency plans are inadequate

Source: Managing Supply Chain Risks (Kouvelis, 2009)
Structural Changes

- Digitisation
- Technology
- Air versus sea
Tech Trends

- Advanced manufacturing technologies
- RFID
- The Internet of Things
- Last mile delivery
- Drones
- Robots
- Autonomous vehicles
- AI & Data analytics
- Blockchain

How do they affect the competitive priorities of cost, flexibility, speed, quality, and service?
On NZ Ag

- Supply chains are changing in many ways
- Some is non-disruptive but productive
  - Precision ag, tech assistance, etc.
- Some may change SC structure
  - Blockchain, co-ops, vertical farming, COVID-19
- High tech food may change how we eat
  - Too early to tell
Physically Efficient Supply Chains

- **Cost concerns:**
  - inventory holding, transportation, handling and manufacturing costs

- **What do we usually see?**
  - Large manufacturing batches to achieve scale
  - Minimum order quantities to reduce handling/order processing costs
  - Full truck load shipments

- **Focus on traditional cost measures:**
  - Inventory turns, factory and transportation utilisation
Market Responsive Supply Chains

- Cost concerns:
  - Inventory obsolescence, lost sales/poor service

- What to do:
  - Pay a premium for flexibility: faster transportation, lower transportation and factory utilisation, smaller batches
  - Postpone variety as much as possible
  - Reduce low value added variety

- Focus of flexibility:
  - Avoid emphasis on traditional explicit costs (inventory holding, transportation efficiency, manufacturing utilisation)
  - Recognise that opportunity cost of lost sales and poor service are high
Matching Supply Chains With Product Demand Characteristics

<table>
<thead>
<tr>
<th>Supply Chain Types</th>
<th>Functional</th>
<th>Innovative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficient</td>
<td>Mismatch</td>
<td></td>
</tr>
<tr>
<td>Responsive</td>
<td>Mismatch</td>
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The Reality

• Far away from markets
• Low physical connectivity
• Many small businesses with lean processes

Difficult to have a responsive supply chain!
What Next?

- Recession most places – depression will depend on government actions
- Supply chains will refill and readjust
- Travel restrictions won’t be lifted for a long time
  - Maybe see world divide into with and without COVID endemic regions?
- Some of the move to online will become permanent
The Centre for Supply Chain Management

- **Produce world-class supply-chain research** that is relevant to the New Zealand environment and the economic challenges confronting the nation
- **Disseminate both the Centre’s research** and supply chain best practices through print, electronic media, seminars, and education
- **Bring together a critical mass** of New Zealand companies involved in various roles in supply chains to facilitate engagement and debate on matters of common interest
The Centre for Supply Chain Management

Research Themes

• Supply chain collaboration
• Supply chain risk management
• Sustainable supply chain management
• Supply chain networks and infrastructure
Our Research Team

- Inventory management
- Logistics and Transportation
- Knowledge management
- Research
- Healthcare management
- Product development
- Supply chain coordination

PhDs from
- Stanford University
- PennState
- Georgia Tech
- HEC
- University of Calgary
The Strategic Supply Chain Executive Programme

- The Centre is taking an active role in developing mid-career supply chain professionals to become the next generation of strategic supply chain leaders.
- Ten-day programme set across five modules, held over five months.
- Who Should Attend:
  - Currently be in a mid-to-senior supply chain or related role for at least five years (e.g. procurement, inventory, planning, logistics or related disciplines).
  - Have been identified as having potential to progress to a senior leadership role within the next five years.
- For further information contact Felicity Lawrence:
  f.lawrence@auckland.ac.nz
- Or go to: https://www.exec.auckland.ac.nz/c-suite/strategic-supply-chain-management/
My Wishlist for Government

- A stocktake of our preparedness for self-sufficiency
- Put lots of money into research
  - *The Entrepreneurial State* by Mariana Mazzucato
- Allow immigration for work visas (but make sponsoring company pay for quarantine)
- Allow immigration for PostGrad student visas (student pays for quarantine)
  - Many of our PostGrad programmes don’t have sufficient numbers to run for kiwis only