How to Avoid Costly Mistakes in Preparing Your Supply Chain for a COVID-19 Recovery

Facilitated by: Rocco Surace

Presented by: Miguel Abuhab, Yaniv Dinur, Henry Camp, Peter A. Bolstorff, Yaniv Dinur, and Dr. Alan Barnard
Opening Thoughts

• What has changed for your customers
• What has changed in the markets you serve?
• Have you thought about other opportunities?
• Do any of your products or services need rethinking:
  – How they are made?
  – Where they are made
  – How they are distributed?
Opening Thoughts

• For your role in your supply chain
  – What is the path back
  – *Can you offer a better way for your market*

• To restart your operations
  – What is your plan?
  – What are best practices?
  – What does risk management look like?
Opening Thoughts

• Is it time to truly leverage the power of technology
  – In planning
  – In operations
  – In supply chain communications
Opening Thoughts

• What are the capabilities needed to manage working capital assuming the continuing variability that will likely continue:
  • Maintaining liquidity
  • Maintaining inventory levels
  • Building / maintaining protective capacity
  • Future capital needs
  • Fully understanding leverage?
How to avoid costly mistakes in preparing your Supply Chain for a COVID-19 recovery

Miguel Abuhab
CEO of Neogrid
Root Causes for inefficiency in Supply Chain

Manufacturer
- Lack of visibility
- Exploit capacity
- Forecasting – Historical data

Retailer
- Opportunity purchases
- Measures by unit prices
Change on consumer behavior
Sample

188 Stores

10 Retail chains

7 States

209 Categories

<table>
<thead>
<tr>
<th></th>
<th>February</th>
<th>March</th>
<th>April</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased</td>
<td>117</td>
<td>55%</td>
<td>45</td>
</tr>
<tr>
<td>Decreased</td>
<td>92</td>
<td>44%</td>
<td>164</td>
</tr>
</tbody>
</table>
Consumer Behavior – Beer

Sales (BRL)

-29.6%

Throughput

-29.7%

OSA

1.5pp

Profitability (%)

Inventory (BRL)
Consumer Behavior – Toilet Paper

**Sales (BRL)**

- JAN
- FEB
- MAR
- APR

**Profitability (%)**

- FEB
- MAR
- APR

**Throughput**

- JAN
- FEB
- MAR
- APR

**OSA**

- JAN
- FEB
- MAR
- APR

**Inventory (BRL)**

- FEB
- MAR
- APR
Best and Worst Performers Categories

Sales (BRL)
- JAN: 2.5%
- FEB: 10.6%
- MAR: 2.5%
- APR: 10.6%

Inventory (BRL)
- JAN: -11.0%
- FEB: 5.3%
- MAR: -11.0%
- APR: 5.3%

Throughput
- JAN: 2.4%
- FEB: 10.4%
- MAR: 2.4%
- APR: 10.4%

OSA
- JAN: 0.6pp
- FEB: -0.6pp
- MAR: 0.2pp
- APR: -0.6pp

Profitability (%)
- JAN: 1.7pp
- FEB: 0.8pp
- MAR: 1.7pp
- APR: 0.8pp

Inventory Turns
- JAN: 9.3%
- FEB: 9.3%
- MAR: -7.3%
- APR: -7.3%
The New Constraint

CASH

© Copyright Neogrid | All rights reserved.

Prohibited reproduction
Retailers must increase availability while reducing inventory

Two important metrics are needed:
- OSA - On-shelf-availability
- Inventory Turns

The manufacturers must provide:
- Higher OSA
- Higher Inventory Turns
Retailers Benchmark
Categories Benchmark

OSA (On-shelf-availability) vs Inventory Turns
Supplier Benchmark - Category Pasta
How to avoid costly mistakes in preparing your Supply Chain for a COVID-19 recovery

**Retailer**
- Share daily inventory and sales data with manufacturer
- Negotiate contracts for three or six month in **unit price** instead of opportunity purchase
- Measures by **OSA** and **Inventory Turns**

**Manufacturer**
- Offers for three or six months on **unit price**
- Replenishing according to actual demand
New Business Rules to recover your Supply Chain

Responsiveness

Share Sell-Out data
Concluding...

“If the constraint is cash, then Inventory Turns is the decisive competitive edge.”

Miguel Abuhab
My name is Yaniv Dinur, and I was working closely with Dr. Eli Goldratt for many years. In the last 15 years, I'm leading Progressive Flow (a worldwide consulting company with offices in Tel Aviv, Tokyo, and Sofia) and Progressive Labs (a SaaS SC software operating from Israel).

Like many of the presenters here, my background is TOC, and I can talk for hours about companies' constraints. But when we are talking about human behavior, and we ask ourselves what a human constraint is? Many answers come to mind – is it time? Is it personal capabilities?

Our answer is that, in most cases, the human constraints is fear. Eli gave a brilliant analysis of managers' three fears (complexity, unknown, and conflicts). Still, I trust we all can agree that in this time of worldwide pandemic, there is an increase of magnitude in the fears level of all S.C. participants (from consumers to manufacturers).

• These increased level of fears will create a vicious circle of mistakes.
• And a very negative atmosphere (in some cases for a cause as many people experience real damage from the pandemic).

But the pandemic also opened real opportunities to improve S.C., and this is the subject of my message today.
Capitalized on the Coronavirus crisis

This terrible health and economic crisis, where so many people lost their life and income, is putting us in an excellent position to help and to make a change. I can see a massive opportunity for TOC knowledge and tools to three phenomena that are happening (and will continue to grow in time) -

1. Supply chains will shorten - In the last decades, S.Cs become longer and longer, bringing parts and finished goods from China, Cambodia, or any place there is a price advantage. We will see more and more countries (and big companies) shortening their S.Cs. A good example is Japan, where the government dedicated a $2.2 billion stimulus package to bring manufacturing back to Japan. Shorter S.Cs is an excellent first step to have a faster loop and better synchronization between demand and supply and a unique opportunity to offer these companies our solutions.

2. We will see more and more on-line commerce. The crises brought many more families to E-commerce (not only the young generation but behavior change of all populations). This phenomenon will call for creative solutions in fulfillment (have in stock and transport the goods on time) that TOC can contribute a lot too.

3. Our vast experience and tools with working with very challenging S.Cs in so many different environments and constraints is putting us in an excellent position to overcome the mistakes companies will do.
supply chains will shorten

- In the last decades, S.Cs become longer and longer, bringing parts and finished goods from China, Cambodia, or any place there is a price advantage.
- The king driver was low price per product – I often asked my customers, is the cost of X for this product is good price or not. In most cases they did not consider the aspect of what is the inventory turn for this product. Have I really sold it (the end customer used it...) within days? Weeks? Months? More...
- A change of consciousness, where Inventory turns will return to be much more impertinent then the price per item, as it should be. The agility of S.Cs. and its ability to react to changes down stream, but not less important, up-stream, will become critical success factors.
- We will see more and more countries (and big companies) shortening their S.Cs. A good example is Japan, where the government dedicated a $2.2 billion stimulus package to bring manufacturing back to Japan.
- Shorter S.Cs is an excellent first step to have a faster loop and better synchronization between demand and supply and a unique opportunity to offer these companies our solutions.
- Modern tools that offers hybrid DBM (taking into consideration also forecast), strong AI capabilities, and the ability to have strong and immediate “what if” simulations will be essential to capitalize on the new opportunities.
The closure brought many more families to E-commerce. The necessity to buy on-line accelerates the behavioral change which brought on-line commerce to older people that hesitated to use it before.

The common belief is that E-commerce eases the complexity of S.Cs due to the fact we are using much fewer distribution points and the idea that the consumer tolerance time is bigger. Of course, it also brings additional complexity in delivering the goods to the customers.

If new on-line shops will not give an excellent service (availability of goods) coupled with relatively low inventories, they will become less competitiveness and may erode the opportunity.

This phenomenon will call for creative solutions both for B2C, B2B and, B2G in fulfillment (have in stock and transport the goods on time) that TOC can contribute a lot too.
how TOC can help

- Our vast experience and tools with working with very challenging S.Cs in so many different environments and constraints are putting us in an excellent position to overcome the mistakes companies will do.

- TOC can help manufacturers not only to shorten the production lead time and by that solving the need for protective capacity that is so needed to cater to the changes in demand but can dramatically improve the synchronization between the variability and uncertainty in demand and supply, and overall increase the company’s throughput.

- The tools we have developed, using deep learning, AI and strong visualization, helps planners, management, and all S.Cs specialist to improve inventory turn dramatically and to much better synchronize manufacturing to real demand.
CORONAVIRUS RELATED SUPPLY CHAIN SHORTAGES

INFINITY LOOP
Container departures per region

Container departures per country - Asia

Source: CargoWise — industry analysis Feb 2020
Business stops completely!

Purchasing overloaded

Replenishment is overlooked

Find alternative RM sources

COVID-19 Infinity Loop

Worry about the present

A logical start

Persistent shortages

Coronavirus RM delays

Personal risk

ESP+@SSCo.Pro

Solving Problems

Making Heroes

Shippers Solutions
ESP+ MAKES CAPACITY FOR A SOURCING EXPLOSION!

![Graph showing a comparison between replenishment and sourcing before and after COVID-19. The graph illustrates a significant increase in sourcing capacity after COVID-19.](ESP+@SSCo.Pro)
Henry is an entrepreneur who founded a private equity fund specifically to earn extraordinary returns using TOC. He currently owns and operates all or part of four companies from manufacturing and supply chain to software development.

He is fascinated by and a student of business breakthroughs.

His goal is to demonstrate that uninterrupted improvement is always possible.

Camp’s Law:
“When in doubt, choose the less efficient route.”
Supply Chain will be a Driver in Economic Recovery

Lessons Learned from COVID-19 Preparedness, Response, and Recovery

Peter Bolstorff
Executive Vice President, Corporate Development
May 8, 2020
Lessons from COVID-19 Preparedness, Response, and Recovery

- We know the best supply chains will:
  - Fully integrate risk management with synchronized planning
  - Develop more effective public-private collaboration
  - Re-balance global supply networks with Agility as a Competitive Advantage
  - Update risk management playbooks for global health and climate change events
  - Double down on digital investments
COVID-19 Impact

- The majority of ASCM corporations have a digital transformation roadmap, though none are defined the same.
- COVID-19 amplified the need – it did not change it.

Moving forward, what digital investments will make my supply chain more resilient, sustainable, and circular?
Shift from Sequential Chains to Concurrent Networks

DSNs allow us to move from Sequential Chains to Concurrent Networks
Focus Digital Investments on Strategic Areas that Drive Performance

Based on project portfolio results of 90 SCOR based transformation programs from 30 companies across 6 industries over a 12 year span. XX denotes highest impact.

<table>
<thead>
<tr>
<th>Strategic Focus Area</th>
<th>Revenue ($)</th>
<th>Perfect Order Fulfillment (%)</th>
<th>Order Fulfillment Cycle Time (days)</th>
<th>Upside Supply Chain Flexibility (days)</th>
<th>Total Supply Chain Management Cost ($)</th>
<th>COGS ($)</th>
<th>Inventory ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demand Management and Forecasting</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2. Supply Management Practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ERP and Advanced Planning System Utilization</td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
<td></td>
<td>XX</td>
<td>X</td>
</tr>
<tr>
<td>4. Data Integrity and Information Management</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Supplier Flexibility</td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
<td></td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>6. Integrated Product Life Cycle Management</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X XX</td>
</tr>
<tr>
<td>7. Integrated Sales and Operations and Tactical Planning</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td></td>
<td>X</td>
<td>XX</td>
</tr>
<tr>
<td>8. Efficiency and Effectiveness of the Physical Supply Chain Network</td>
<td></td>
<td></td>
<td>XX</td>
<td></td>
<td>XX</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>9. Order Management Discipline</td>
<td>XX</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10. Return Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>11. Inventory Control Practices</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Manufacturing Flow</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>XX</td>
</tr>
</tbody>
</table>
How to Avoid Costly Mistakes in preparing Your Supply Chain for a Covid-19 Recovery

Presented by: Dr. Alan Barnard, CEO Goldratt Research Labs
Date: 8th May, 2020
What will be the Shape of YOUR Covid-19 Recovery?

V : Fast and Full Recovery
U : Slow but Full Recovery
L : No Recovery
J : Slow but “2x” Recovery

BEFORE
DURING
AFTER

Poll Results: 16-30 April 2020

POLL #1 - COVID19 COMPANY IMPACT
WHICH OF THESE RECOVERY SCENARIOS ARE MOST LIKELY FOR YOUR COMPANY’S INCOME?

V : 18%
U : 58%
L : 16%
J : 8%

POLL #2 - COVID19 PERSONAL IMPACT
WHICH OF THESE RECOVERY SCENARIOS ARE MOST LIKELY FOR YOUR PERSONAL INCOME?

V : 13%
U : 44%
L : 34%
J : 9%
Case Study 1: Global Passenger Car Industry

Modelled impact of COVID-19 on global passenger car sales in 2020
Monthly car sales, in mio. units

BY REGION

Global impact on car sales 2020

Total 2020

China: -15%
RoW: -17% to -35%
Europe: -18% to -36%
USA: -18% to -35%

(63 mio. instead of 76 mio. cars)

(54 mio. instead of 76 mio. cars)

Current phase:

Wind down  Ramp up  Future
Case Study 2: Recovery Scenario Simulations

Co. XYZ Monthly Revenues Simulation – 4 Recovery Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget</td>
<td>$35.00</td>
<td>$45.00</td>
<td>$55.00</td>
<td>$55.00</td>
<td>$35.00</td>
<td>$40.00</td>
<td>$45.00</td>
<td>$60.00</td>
<td>$55.00</td>
<td>$35.00</td>
<td>$65.00</td>
<td>$75.00</td>
</tr>
<tr>
<td>V-Shape</td>
<td>$35.00</td>
<td>$45.00</td>
<td>$45.00</td>
<td>$25.00</td>
<td>$15.00</td>
<td>$25.00</td>
<td>$40.00</td>
<td>$50.00</td>
<td>$50.00</td>
<td>$35.00</td>
<td>$55.00</td>
<td>$70.00</td>
</tr>
<tr>
<td>U-Shape</td>
<td>$35.00</td>
<td>$45.00</td>
<td>$45.00</td>
<td>$25.00</td>
<td>$15.00</td>
<td>$20.00</td>
<td>$25.00</td>
<td>$35.00</td>
<td>$45.00</td>
<td>$35.00</td>
<td>$65.00</td>
<td>$70.00</td>
</tr>
<tr>
<td>L-Shape</td>
<td>$35.00</td>
<td>$45.00</td>
<td>$45.00</td>
<td>$25.00</td>
<td>$15.00</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$30.00</td>
<td>$25.00</td>
<td>$30.00</td>
<td>$45.00</td>
</tr>
<tr>
<td>J-Shape</td>
<td>$35.00</td>
<td>$45.00</td>
<td>$45.00</td>
<td>$25.00</td>
<td>$15.00</td>
<td>$20.00</td>
<td>$25.00</td>
<td>$35.00</td>
<td>$50.00</td>
<td>$50.00</td>
<td>$80.00</td>
<td>$100.00</td>
</tr>
</tbody>
</table>
Case Study 2: Financial Impact Analysis

<table>
<thead>
<tr>
<th>Description</th>
<th>Budget</th>
<th>V-Shape</th>
<th>U-Shape</th>
<th>L-Shape</th>
<th>J-Shape</th>
<th>Worst Case</th>
<th>Best Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>%</td>
<td>Value</td>
<td>%</td>
<td>Value</td>
<td>%</td>
<td>Value</td>
</tr>
<tr>
<td>Covid-19 Impact</td>
<td>0</td>
<td>-18%</td>
<td>-23%</td>
<td>-41%</td>
<td>-13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Revenue</td>
<td>$600.00</td>
<td>100%</td>
<td>$490.00</td>
<td>100%</td>
<td>$460.00</td>
<td>100%</td>
<td>$355.00</td>
</tr>
<tr>
<td>Variable Cost</td>
<td>$300.00</td>
<td>50%</td>
<td>$259.70</td>
<td>53%</td>
<td>$253.00</td>
<td>55%</td>
<td>$273.00</td>
</tr>
<tr>
<td>Gross Margin</td>
<td>$300.00</td>
<td>50%</td>
<td>$230.30</td>
<td>47%</td>
<td>$207.00</td>
<td>45%</td>
<td>$252.00</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>$240.00</td>
<td>40%</td>
<td>$225.00</td>
<td>46%</td>
<td>$220.00</td>
<td>48%</td>
<td>$230.00</td>
</tr>
<tr>
<td>Net Profit</td>
<td>$60.00</td>
<td>10%</td>
<td>$5.30</td>
<td>1%</td>
<td>-$13.00</td>
<td>-3%</td>
<td>$22.00</td>
</tr>
<tr>
<td>Investment</td>
<td>$200.00</td>
<td></td>
<td>$180.00</td>
<td></td>
<td>$170.00</td>
<td></td>
<td>$220.00</td>
</tr>
<tr>
<td>ROI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash On Hand</td>
<td>$60.00</td>
<td></td>
<td>$50.00</td>
<td></td>
<td>$25.00</td>
<td></td>
<td>$35.00</td>
</tr>
<tr>
<td>Cash Runway (# months)</td>
<td>3.0</td>
<td></td>
<td>2.7</td>
<td></td>
<td>1.4</td>
<td></td>
<td>0.6</td>
</tr>
</tbody>
</table>

Notes: 1) Negotiations with Employees and Unions enabled some reductions in OpEx
2) Scarcity of some raw materials and components increase Variable Cost %
3) Cash runway should be monitored VERY closely during a demand downturn
## Case Study 2: Financial Impact Analysis

### Covid-19 Impact

<table>
<thead>
<tr>
<th>Description</th>
<th>Budget</th>
<th>V-Shape</th>
<th>U-Shape</th>
<th>L-Shape</th>
<th>J-Shape</th>
<th>Worst Case</th>
<th>Best Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>%</td>
<td>Value</td>
<td>%</td>
<td>Value</td>
<td>%</td>
<td>Value</td>
</tr>
<tr>
<td>Covid-19 Impact</td>
<td>0</td>
<td>-18%</td>
<td>-23%</td>
<td>-41%</td>
<td>-13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Revenue</td>
<td>$600.00</td>
<td>100%</td>
<td>$490.00</td>
<td>100%</td>
<td>$460.00</td>
<td>100%</td>
<td>$355.00</td>
</tr>
<tr>
<td>Variable Cost</td>
<td>$300.00</td>
<td>50%</td>
<td>$259.70</td>
<td>53%</td>
<td>$253.00</td>
<td>55%</td>
<td>$195.25</td>
</tr>
<tr>
<td>Gross Margin</td>
<td>$300.00</td>
<td>50%</td>
<td>$230.30</td>
<td>47%</td>
<td>$207.00</td>
<td>45%</td>
<td>$159.75</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>$240.00</td>
<td>40%</td>
<td>$225.00</td>
<td>46%</td>
<td>$220.00</td>
<td>48%</td>
<td>$200.00</td>
</tr>
<tr>
<td>Net Profit</td>
<td>$60.00</td>
<td>10%</td>
<td>$5.30</td>
<td>1%</td>
<td>-$13.00</td>
<td>-3%</td>
<td>-$40.25</td>
</tr>
<tr>
<td>Investment</td>
<td>$200.00</td>
<td></td>
<td>$180.00</td>
<td></td>
<td>$170.00</td>
<td></td>
<td>$160.00</td>
</tr>
<tr>
<td>ROI</td>
<td>30%</td>
<td>3%</td>
<td>-8%</td>
<td>-25%</td>
<td>10%</td>
<td>-184%</td>
<td>-67%</td>
</tr>
<tr>
<td>Cash On Hand</td>
<td>$60.00</td>
<td></td>
<td>$50.00</td>
<td></td>
<td>$25.00</td>
<td></td>
<td>$10.00</td>
</tr>
<tr>
<td>Cash Runway (# months)</td>
<td>3.0</td>
<td>2.7</td>
<td>1.4</td>
<td>0.6</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Best Case Description
-18% V-Shape, -23% U-Shape, -41% L-Shape, -13% J-Shape

### Worst Case Description
-47% V-Shape, -16% U-Shape, -47% L-Shape, -16% J-Shape

### Notes:
1) Negotiations with Employees and Unions enabled some reductions in OpEx
2) Scarcity of some raw materials and components increase Variable Cost %
3) Cash runway should be monitored VERY closely during a demand downturn
## Avoiding Common SCM Decision Mistakes

### Making better faster decisions by AVOIDING common decision mistakes

**Principles (Universal) vs. Best Practices/Applications (Specific)**

**What?**
- Effectively and Efficiently satisfy market demand

**How?**
- Continuously Improving & Synchronizing (Balancing) Flow

### PLANNING
**Decisions before we start work**

<table>
<thead>
<tr>
<th>MISTAKE 1A</th>
<th>MISTAKE 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause Self-imposed demand volatility or Misallocate Resources based on Forecast or Local Buffering</td>
<td>Ignoring backlog when making commitments OR not controlling release of WIP based on customer need</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRINCIPLE 1A</th>
<th>PRINCIPLE 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove self-imposed volatility and Dynamically allocate Resources &amp; Aggregate Buffers</td>
<td>Consider Backlog when Quoting &amp; Prioritize WIP Release based on downstream demand and buffer status</td>
</tr>
</tbody>
</table>

### EXECUTION
**Decisions while we do work**

<table>
<thead>
<tr>
<th>MISTAKE 2A</th>
<th>MISTAKE 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prioritize and/or expedite based on local rather than global impact</td>
<td>“Batch” based on local rather than global impact</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRINCIPLE 2A</th>
<th>PRINCIPLE 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Single Priority System and consider global not local impact</td>
<td>Make “Batching decisions based” on global, not local impact</td>
</tr>
</tbody>
</table>

### MEASURE & IMPROVE
**Decisions after we completed work**

<table>
<thead>
<tr>
<th>MISTAKE 3A</th>
<th>MISTAKE 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local optima decisions resulting in balanced capacities or unbalanced demand vs. supply</td>
<td>Focused improvements and dynamic resizing of all buffers to constantly re-balance flow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRINCIPLE 3A</th>
<th>PRINCIPLE 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abolish Local Efficiencies - use Pareto analysis of flow delays (reds/blacks)</td>
<td>Focused improvements and dynamic resizing of all buffers to constantly re-balance flow</td>
</tr>
</tbody>
</table>

**DECISION 1A**
- How to allocate resources and buffers to reliably meet demand at lowest cost?

**DECISION 1B**
- How to make reliable commitments and prioritize & control WIP to prevent “Chaos”?

**DECISION 2A**
- Should we change priorities and/or when to expedite or use “Fast track” option?

**DECISION 2B**
- Should we “batch” (over-produce or ship) to achieve efficiencies?

**DECISION 3A**
- What should be measured (and what not)?

**DECISION 3B**
- When and where should improvements / investments be made?
Recovery Risks: Over-ordering Vicious Cycle

Orders → Resource → Shipments

- Reliability
- Throughput
- Lead Time / WIP

EDGE OF CHAOS

STABILITY

Vicious Cycle:
- Over-Ordering
- Longer Lead Times
- Over-Production

Over-ordering leads to:
- Longer Lead Times
- Over-Production

Zero to 80% Resource Utilization:
- Stable Operations

Beyond 80% Resource Utilization:
- Chaos and Instability
Using Covid-19 to transform from Fragile→Anti-fragile

**FRAGILE**
An organization/country/person that is harmed MORE by Downturns or Failures than it gains from equivalent Upturns or Successes

Limited Gain...Unlimited Pain HARMED by Volatility

**ROBUST**
An organization/country/person that is harmed SAME by Downturns or Failures than it gains from equivalent Upturns or Successes

Limited Gain...limited Pain NOT HARMED by Volatility

**ANTIFRAGILE**
An organization/country/person that is harmed LESS by Downturns or Failures than it gains from equivalent Upturns or Successes

Limited Pain...Unlimited Gain BENEFIT from Volatility
Robustness of Dynamic Buffer Resizing Rules

Stress Testing robustness of Dynamic Buffer Resizing rules across various demand patterns
People FEAR what they DON’T KNOW and what they are UNCERTAIN about. But these only matters if it will …

Change how to best SOLVE, RESOLVE, COPE WITH, or CAPITALIZE ON a situation.

When Demand, not only exceeds Supply, but demand is growing exponentially …

Don’t just look for the BOTTLENECK … start looking for MORE BOTTLES!

Dr. Alan Bomard
Dr. Alan Barnard is one of the leading decision scientists and Theory of Constraints’ experts in the world.

Alan is the CEO of Goldratt Research Labs, and serves as an advisory board member for BHP (World’s largest mining company) and Throughput Inc (Advanced Analytics & AI).

Alan is also a proud father, serial entrepreneur, App developer, Author, Strategy Advisor and Teacher. Alan’s research has focused on understanding why good people make and often repeat bad decisions within their personal lives or at work and to develop simple decision support methods and apps to help people make better faster decisions by preventing avoidable decision mistakes, or at least, enabling people to learn from such mistakes..

Contact me at alan@goldrattresearchlabs.com
For more information, visit www.dralanbarnard.com