Applying Theory of Constraints to Spare Parts Supply Chain Management

NDTA – USTRANSCOM FALL MEETING 2019

goldratt CONSULTING

Breakthrough thinking in action

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Typical Spare Parts Problem

Need to protect Operations
Shortages are painful!
More Inventory!!

Need to control budget/costs
Surpluses are painful
Less Inventory!!

Both shortages and surpluses are a challenge

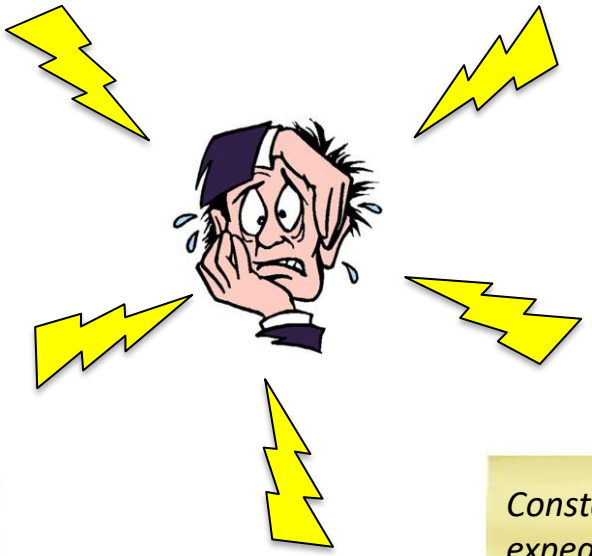
Overall Objective

How to Improve parts availability within Budget

Operational Challenges (typical)

There is high variation in demand (demand spikes, sporadic demand) causing shortages

Forecasting has errors (over or under forecast)



Vendor lead times are long + there are supply Constraints

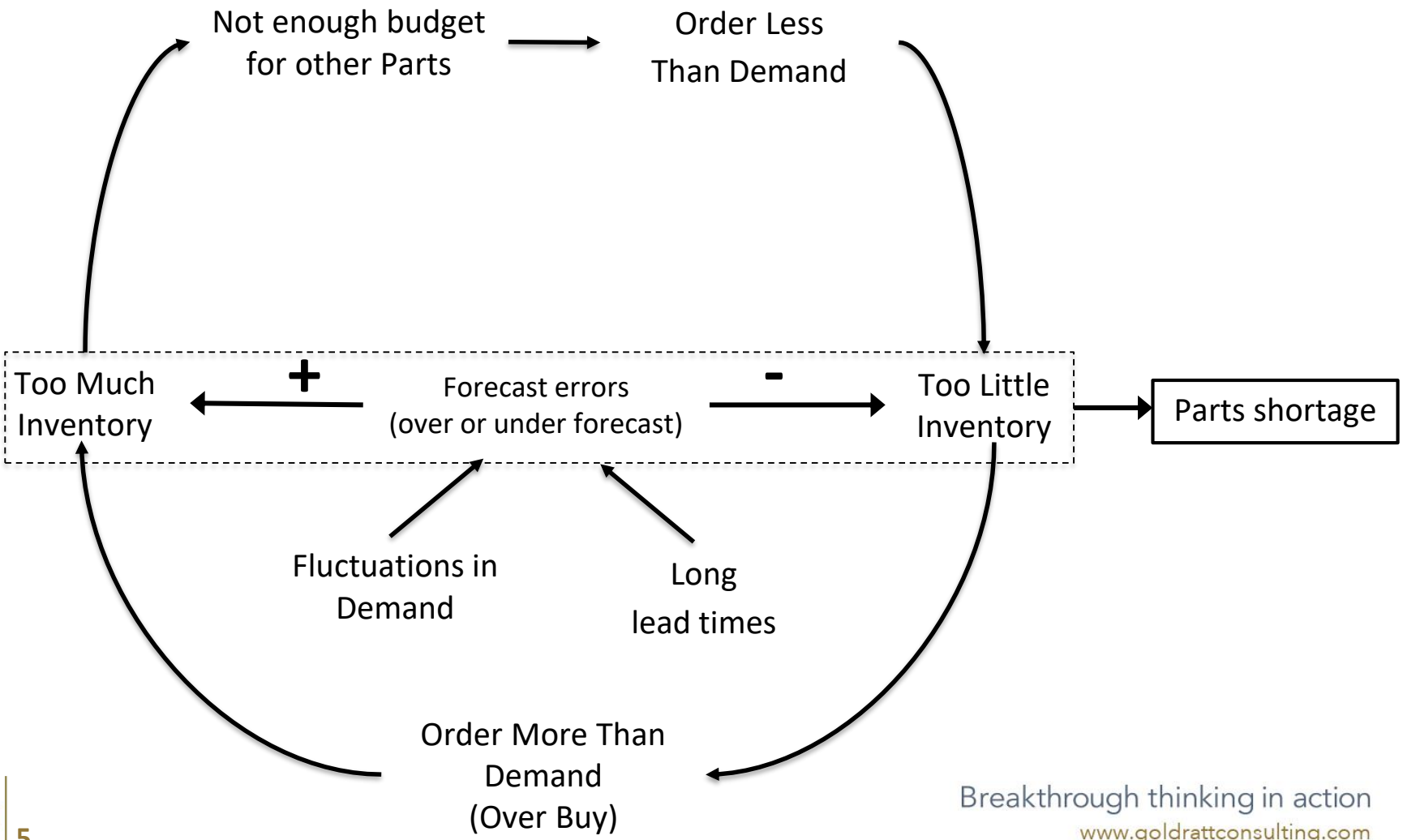
Exponential impact of shortages

Manual cumbersome acquisition processes

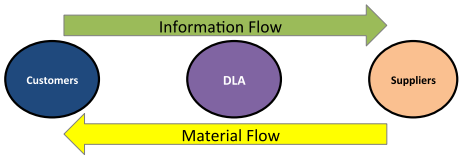
Constant priority changes leading to expediting & fire-fighting

High Workload and not enough capacity

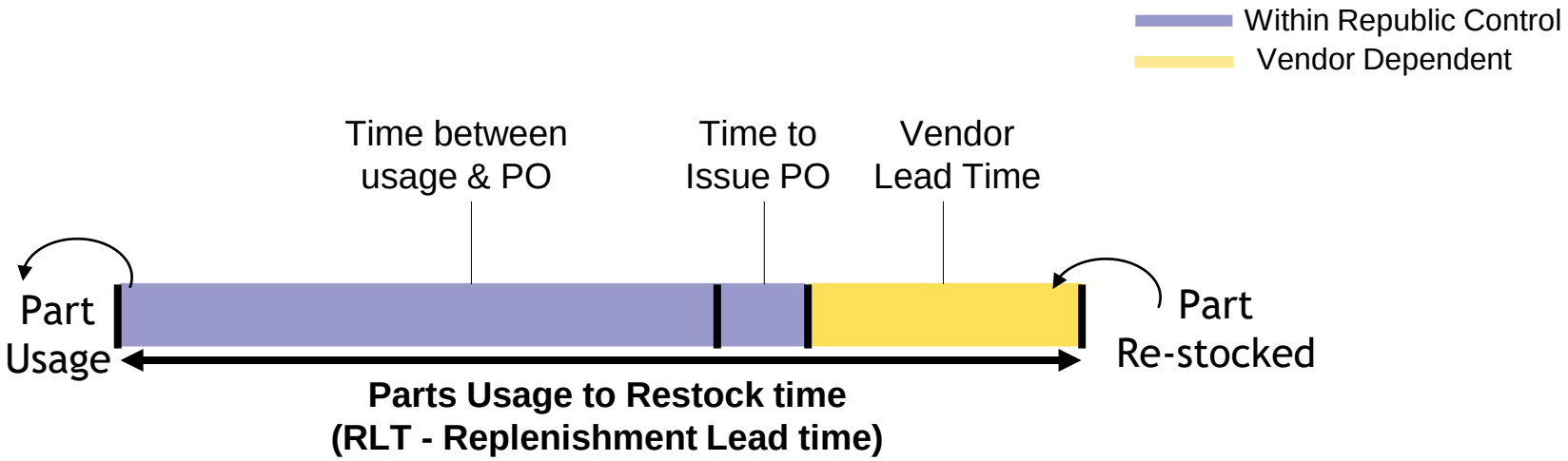
Cause & Effect



TOC vs. Traditional Approaches

Traditional Approaches	1. Improve Forecast Accuracy 2. Buy based on Forecast (PUSH)	
TOC	1. Improve FLOW 2. Buy based on Actual Consumption (PULL)	

Core Concept



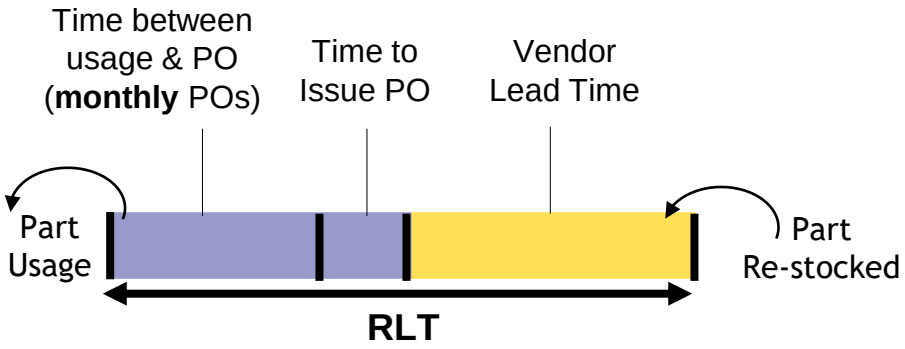
1. Inventory level is equal to Maximum usage over RLT ➔ Longer the RLT, higher the inventory
2. Longer the RLT, worse the forecast accuracy ➔ More shortages & surpluses

Reducing RLT reduces inventory AND reduces shortages

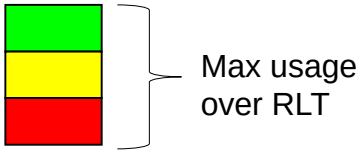
Exercise

Solution Elements

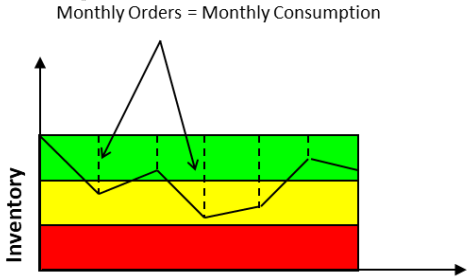
1. Reduce RLT by ordering frequently (i.e. cut time between usage & PO)



2. Set initial inventory (buffer) level = Max Usage Over RLT

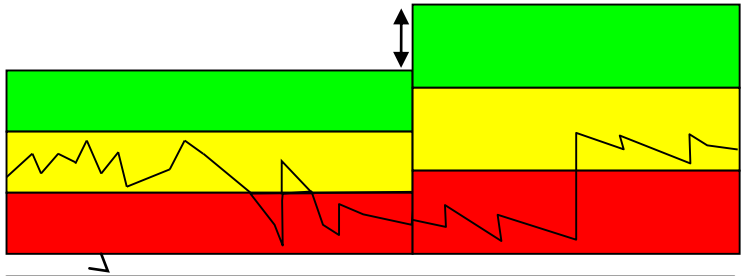


3. Order what is consumed (not EOQ or human intuition)

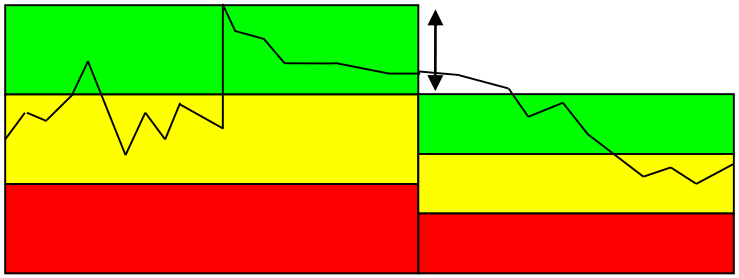


Solution Elements

4. Adjust inventory (buffer) levels based on usage increases or decreases

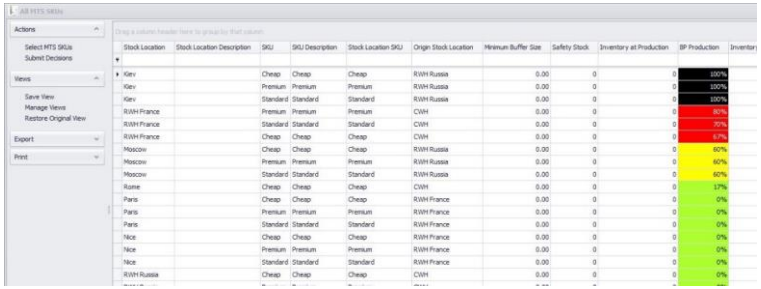


Usage increases ➔ on-hand qty goes "too much red" ➔ increase buffer level & make a one-time additional buy



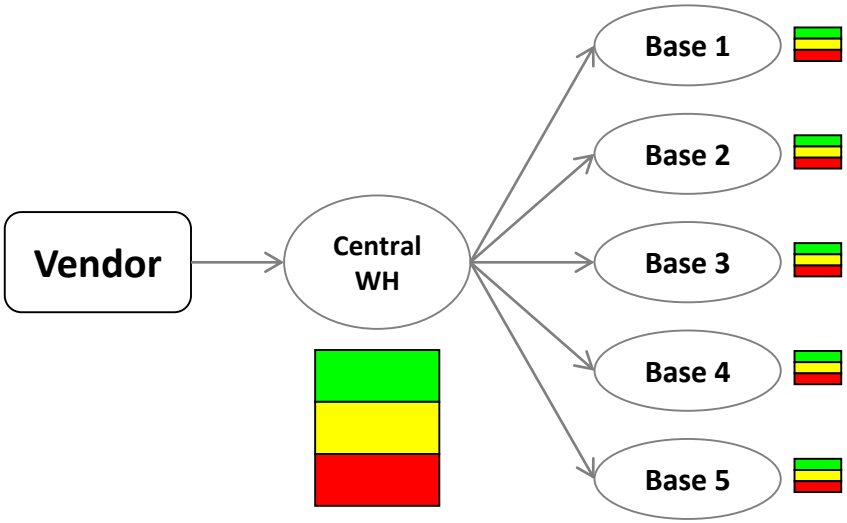
Usage decreases ➔ on-hand qty stays "too much green" ➔ decrease buffer level & stop buy until item returns to green

5. Prioritize vendors and expedite parts based on buffer status



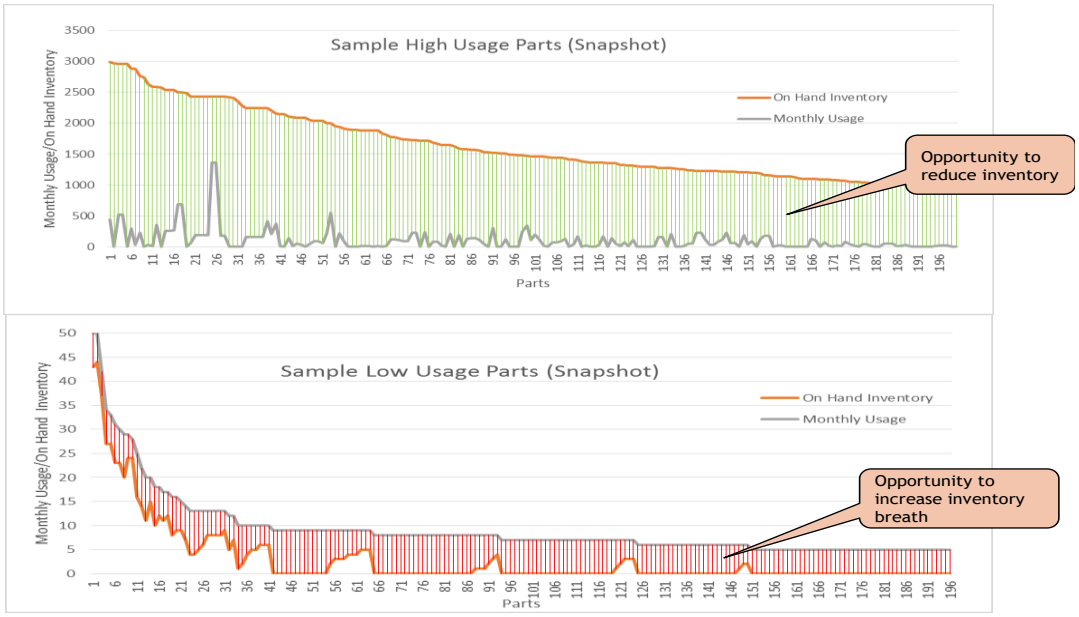
Solution Elements

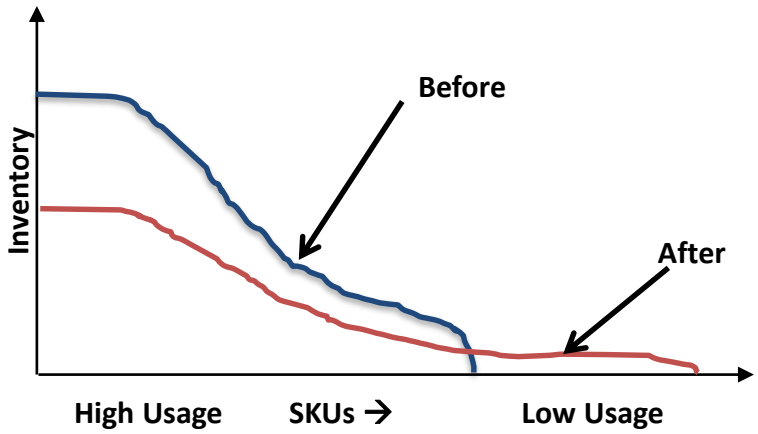
6. Further reduce inventory (for selected high $ parts) by aggregating inventory in central warehouse (CW) and replenishes bases from CW



Solution Elements

7. Re-invest some of savings to increase Inventory breadth for very low usage parts





Summary

1. Set inventory (buffer) levels equal to max consumption over Replenishment Lead Time (RLT)
2. Reduce RLT by ordering frequently (monthly)
3. Order what is consumed (not forecast)
4. Expedite orders based on buffer situation
5. Adjust buffers up and down based on consumption
6. Aggregate and replenish from Central Warehouse
7. Increase Inventory breadth