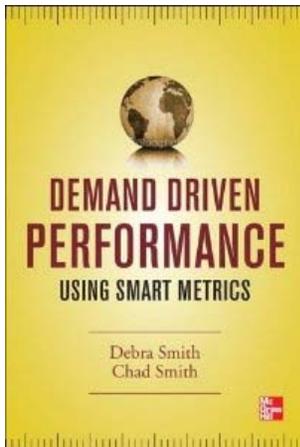


Smart Metrics for

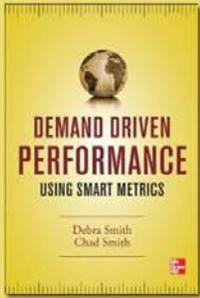


Fooling Ourselves With Irrelevant Information

Hosted by Debra Smith and Chad Smith,
co-authors of *Demand Driven
Performance – Using Smart Metrics*



Complex Supply Chains

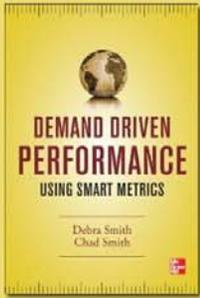


Today's Deep Truth

↓ **Unit Cost** = ↑ **Return on Investment (ROI)**

What if Today's Deep Truth is Totally,
Completely, Unequivocally False?

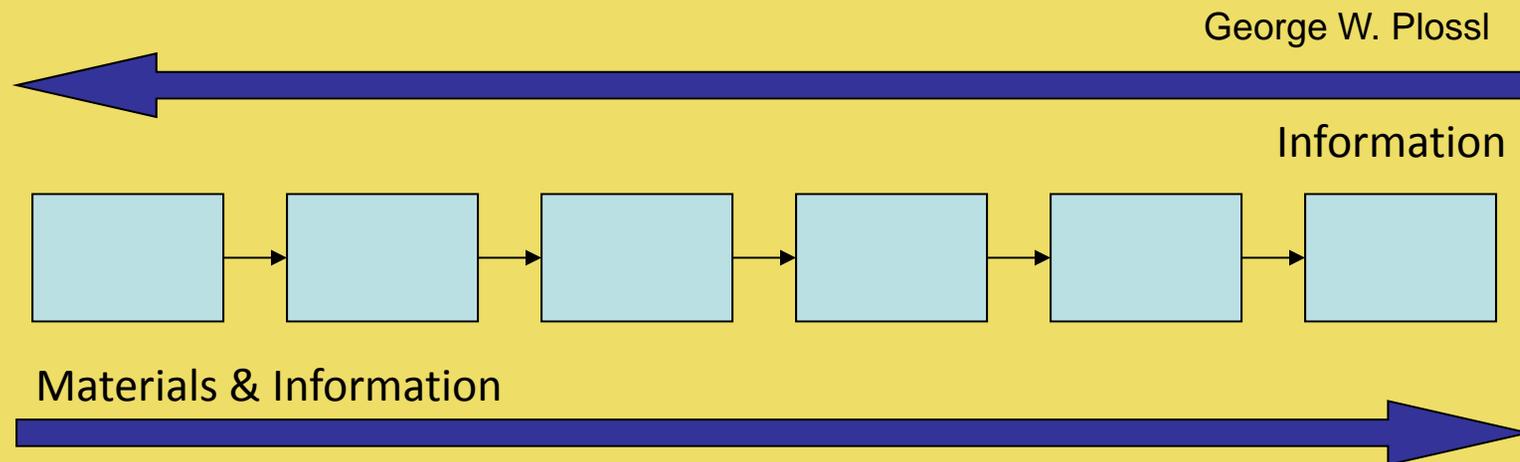
To prove this we will need to understand two
key principles of supply chains



Principle #1: Flow Comes First

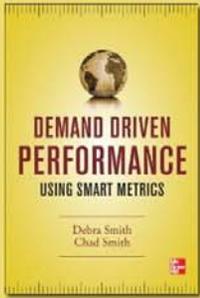
The First Law of Manufacturing:

All benefits (ROI) will be directly related to the speed of
FLOW of materials and information.



Caveat:

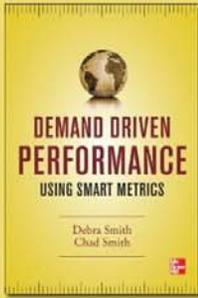
Both Materials and Information must be **RELEVANT**



"All Benefits" Encompass:

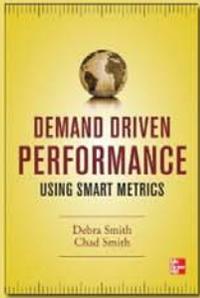
- **Service** is consistent and reliable when a system flows well.
- **Revenue** is maximized and protected.
- **Inventories** are minimized.
- **Expenses** ancillary and/or unnecessary are minimized.
- **Cash flow** follows the rate of product flow to market demand.

**Protect and Promote Flow = ROI
Maximization**



Some Historical Reference

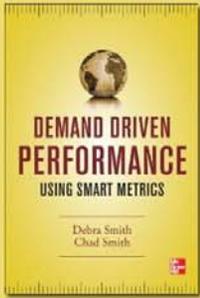
- Pre-1934 management accounting was the focus of reporting information
- 1934 SEC is legislated and GAAP accounting is born
- 1965 material requirements planning (MRP) revolutionized the way companies calculated what to make and buy and when.
- 1972 closed loop MRP integrated capacity scheduling and reconciliation.
- 1980 financials were integrated and MRPII was born. Manufacturing system designed to capture routing time and material usage input became focused primarily on providing a costing system for GAAP



1990 MRPII Evolves into ERP

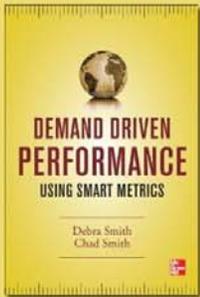
Today at the core of every fast, powerful, expensive ERP is MRPII and all of the problematic unit cost rule assumptions.

Most managers, executives and even accountants have come to relate/accept GAAP costing as relevant information to direct tactics, make decisions and judge resource performance.

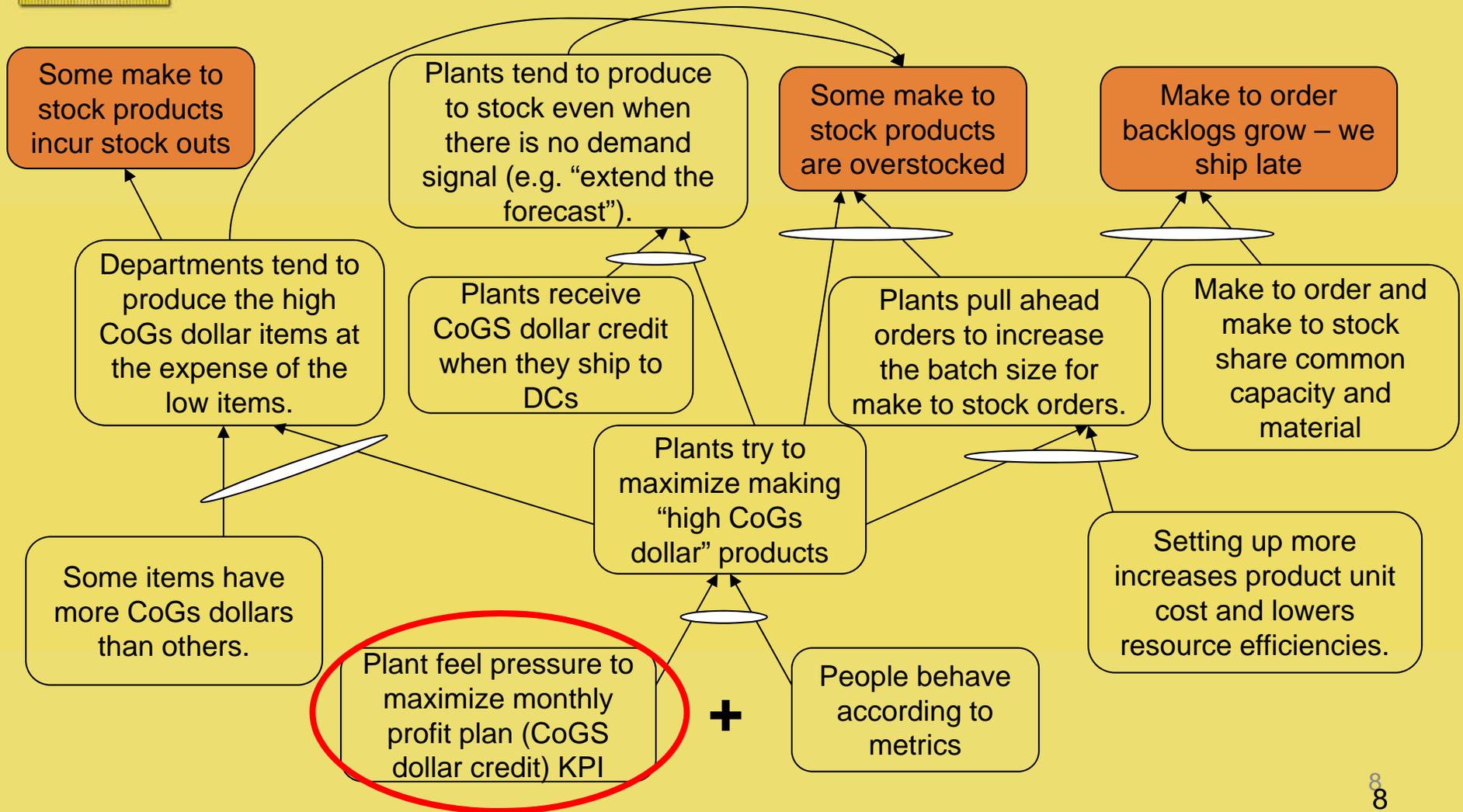


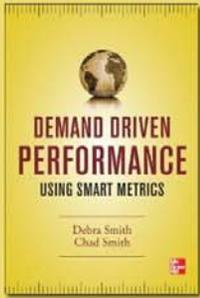
The Trouble With Convention

- Today companies act as if unit cost minimization is undeniably the 1st law.
- All reporting , measures, tactical planning and execution actions seek the following objectives:
 - Minimize total product unit cost
 - Maximize resource efficiency
 - Strive for positive overhead variances for both labor and volume
 - Initiate cost-reduction efforts with emphasis on machine, labor and inventory reductions quantified on fully absorbed standard costs



The Consequences of Focusing on Unit Cost



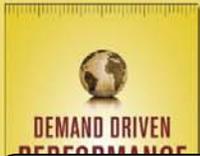


The Consequences of Focusing on Unit Cost

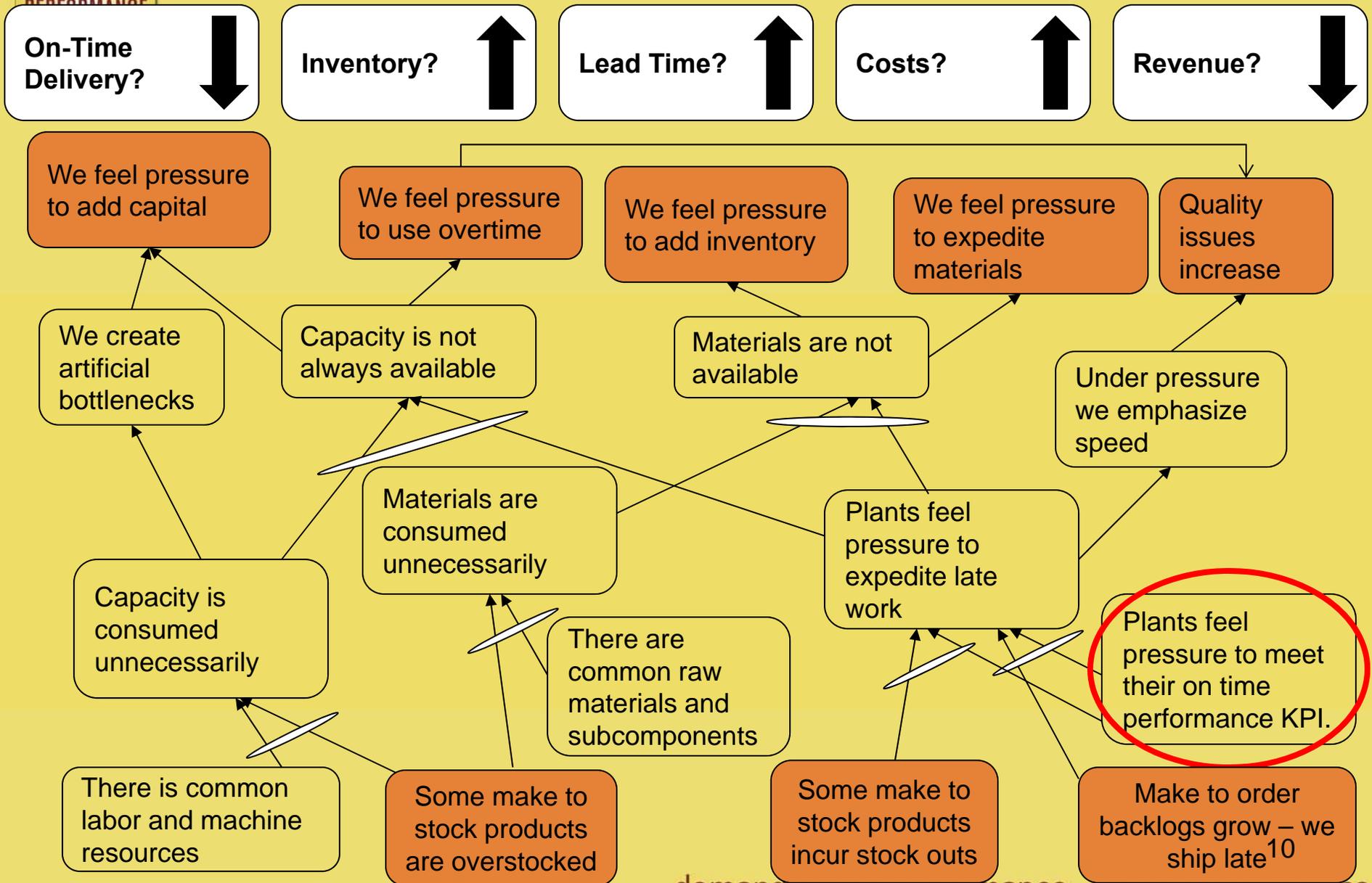
Some make to stock products incur stock outs

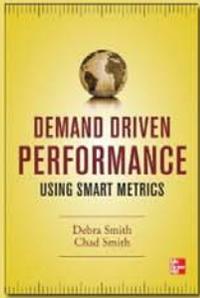
Some make to stock products are overstocked

Make to order backlogs grow – we ship late



The Consequences of Focusing on Unit Cost





Two Competing First Laws

Plants feel pressure to maximize monthly profit plan (CoGS dollar credit) KPI

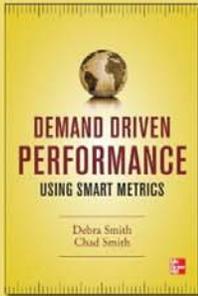
Versus

Plants feel pressure to meet their on time performance KPI.

Cost-Centric Metric

Flow-Centric Metric

Do you see the problem?



Conflicting Actions

Tactical Objective

Efficiency

Margin Maximization

Inventory Turns

Cost-Centric Action

Run larger batches; extend the forecast; run only on optimal resource

Focus on lowering unit product cost

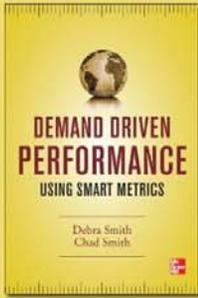
Impose an inventory dollar value; postpone inventory receipt; mandate across the board reductions

Flow-Centric Action

Protect critical resources; run smaller batches to pull; run on any process capable resource

Focus on increasing service level, premium pricing, leveraging constrained resources and incremental revenue opportunities

Commit to strategic stock positions that meet the lead time strategy



Conflicting Actions (cont.)

Objective

Budget Performance

Volume Maximization

Continuous Improvement

Cost-Centric Action

Focus on actions to achieve standard unit cost

Lower price and raise order minimums

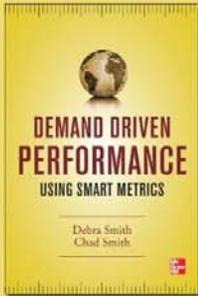
Identify unit cost reduction opportunities through increasing resource efficiency or labor reduction

Flow-Centric Action

Focus on the incremental costs of leveraging flow to the market

Focus on service, lead times and lower order minimums

Identify the largest sources of variation and remove them to lower lead times and reduce investment in all strategic buffers

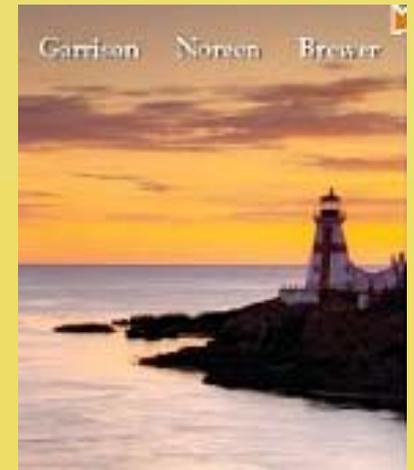


The Importance of “Relevance”

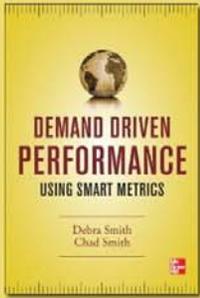
*“Every decision involves choosing from among at least two alternatives. In making a decision, the costs and benefits of one alternative must be compared to the costs and benefits of other alternatives. **Costs and benefits that differ between alternatives are called relevant costs.**”*

*Distinguishing between relevant and irrelevant costs and benefits is critical for two reasons. **First irrelevant data can be ignored – saving decision makers tremendous amounts of time and effort.***

Second, bad decisions can easily result from erroneously including irrelevant costs and benefits when analyzing alternatives. To be successful in decision making, managers must be able to tell the difference between relevant and irrelevant data in analyzing alternatives.”



Noreen, Brewer, Garrison,
“Managerial Accounting for
Managers”, McGraw Hill Irwin,
2008, page 500

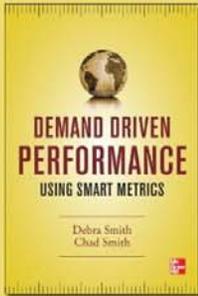


Relevant Range and Unit Cost

Relevant range is the range of activity within which the assumptions about variable and fixed costs remain valid.

- In the “long run” all costs are variable.
- In the “short run” all period costs including, direct labor, are fixed and irrelevant

Unitizing fixed costs create the false impression that overhead costs and direct labor will vary up or down with changes in activity/volume levels.

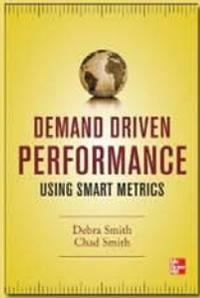


Relevant Range, Tactics and Metrics

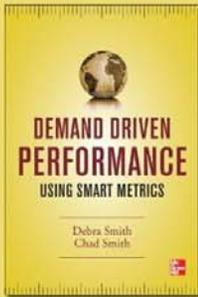
Strategic or Tactical	Plan Time Period	Schedule of Resources	Execute schedule	Metrics - Financial & Nonfinancial	Metric Objective
Strategic	Annually	Capacity plan		Financial & Non	ROI
Tactical	Quarterly	Capacity plan		Financial & Non	ROI
Tactical	Monthly	Capacity plan		Financial & Non	ROI & Flow
Tactical	Weekly	schedule	Weekly	Non-financial	Demand Flow
Tactical	Daily	schedule	Daily	Non-financial	Demand Flow
Tactical	Hourly		Hourly	Non-financial	Demand Flow

Managers can vary “some” fixed costs inside their annual plan and a few inside their quarter.

What overhead costs can be varied inside a month, a week, a day?

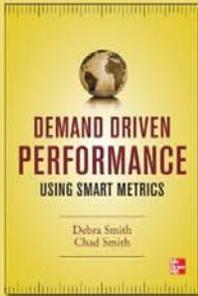


Principle #2: Supply Chains are More Complex



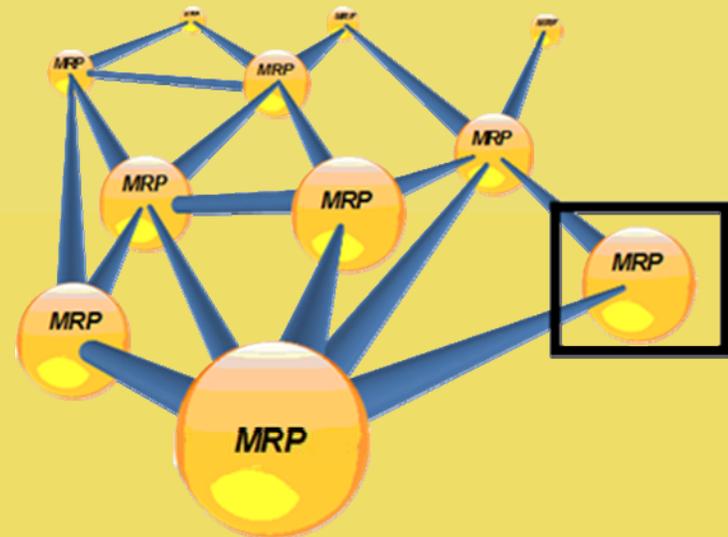
The World Has Changed

Circumstance	1965	2013
Supply Chain Complexity	Low. Supply chains looked like chains – they were more linear. Vertically integrated and domestic supply chains dominated the landscape	High. Supply chains look more like “supply webs” and are fragmented and extended across the globe.
Product Life Cycles	Long. Often measured in years and or decades (e.g. rotary phones)	Short. Often measured in months (particularly in technology)
Customer Tolerance Times	Long. Often measured in weeks and months	Short. Often measured in days with many situations dictating less than 24 hour turns
Product Complexity	Low.	High. Most products now have relatively complex mechanical and electrical systems and micro-systems. Can you even work on a modern car anymore?
Product Customization	Low. Few options or custom feature available.	High. Lots of configuration and customization to a particular customer or customer type.
Product Variety	Low. Example – toothpaste. In 1965 Colgate and Crest each made one type of toothpaste.	High – in 2012 Colgate made 17 types of toothpaste and Crest made 42!
Long Lead Time Parts	Few. Here the word “long” is in relation to the time the market is willing to wait. By default if customer tolerance times were longer it stands to reason that there were less long lead time parts. More so, however, is that fact that supply chains looked different. Most parts were domestically sourced and thus often much “closer” in time.	Many. Today’s extended and fragmented supply chains have resulted in not only more purchased items but more purchased items coming from more remote locations.
Forecast Accuracy	High. With less variety, longer life cycles and high customer tolerance times forecast accuracy was almost a non-issue. “If you build it, they will buy it.”	Low. The combined complexity of the above items is making the idea of improving forecast accuracy a losing battle.
Pressure for Leaner Inventories	Low. With less variety and longer cycles the penalties of building inventory positions was minimized.	High. At the same time operations is asked to support a much more complex demand and supply scenario (as defined above) they are required to do so with less working capital!
Transactional Friction	High. Finding suppliers and customers took exhaustive and expensive efforts. Choices were limited. People’s first experience with a manufacturer was often through a sales person sitting in front of them.	Low. Information is readily available at the click of the mouse. Choices are almost overwhelming. People’s first experience with a manufacturer is often through a screen sitting in front of them.



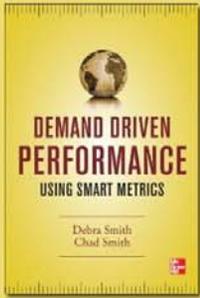
Today's Supply Chains are Complex!

Embedded at the heart of every node is an ERP system and MRP II with all of its problematic forecast planning and cost centric rules



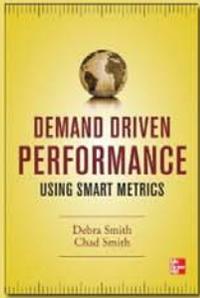
Supply chains are both more fragmented and more connected:

- The wrong rules inside each node transfer variability
- The greater amount of connections amplifies variability

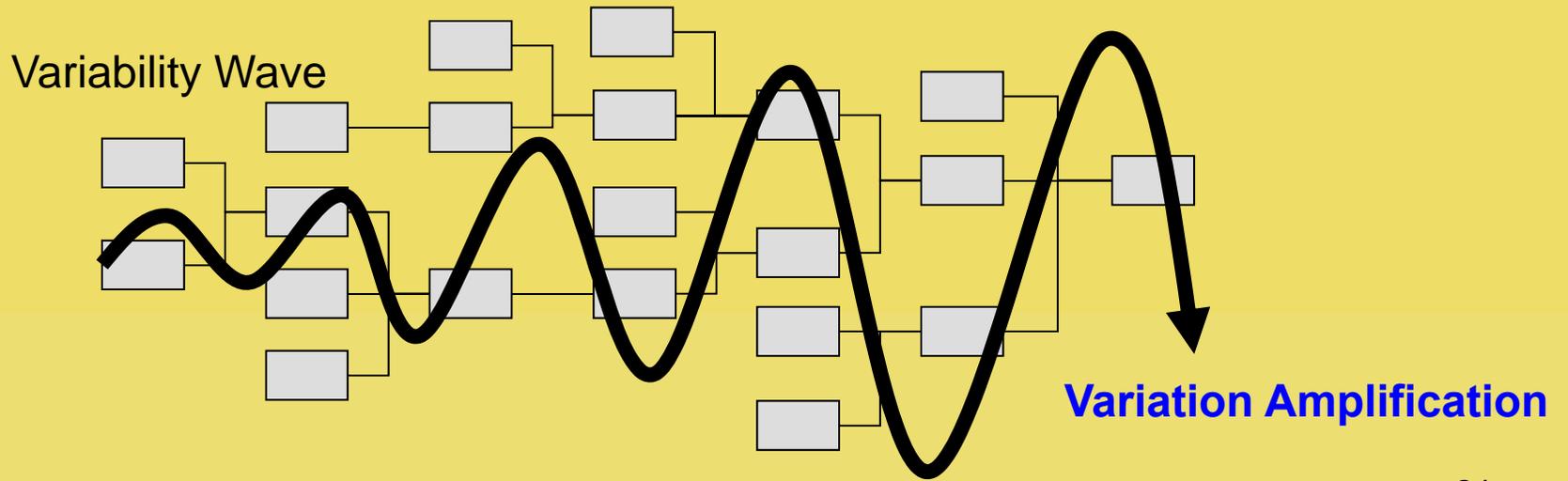
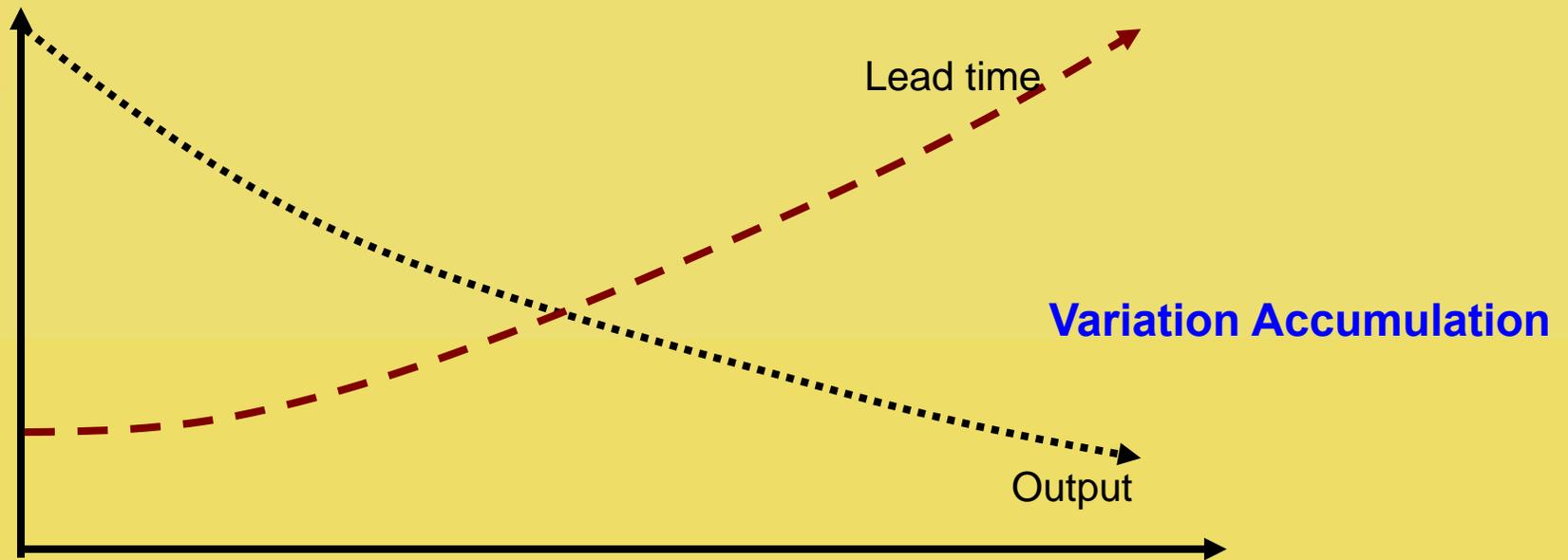


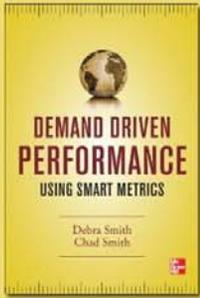
The Law of System Variability

- The more that variability is passed between discrete areas, steps, or processes in a system, the less productive that system will be.
- The more areas, steps, or processes and connections in the system, the more erosive the effect to system productivity will be.



Variability Accumulation & Amplification



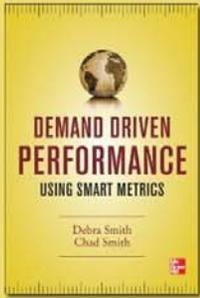


The Game Has Changed

Principle 1 combined with Principle 2 have completely changed the game for supply chains.

Protecting and maintaining flow in these new supply chains requires:

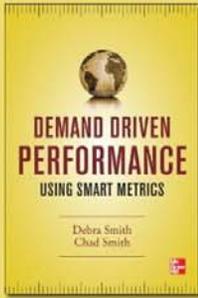
- Understanding Complex Adaptive System - CAS rules to speed flow.
- New thinking to build the right tools to make the status of flow visible and real time.
- Smart metrics are the outcome of the right rules and tools.



Complex Adaptive Systems (CAS)

- CAS is the “new” science explaining complexity.
- CAS have well defined rules and predictable behaviors that govern system flow and cost behavior.
- Conventional thinking is based on a linear system rule set and mathematics.
- CAS rules are different and many are the opposite.

Most business leaders, operational personnel and academics don't know or understand these differences, their implications/opportunities



CAS Are Very Different

System Traits

Linear

Nonlinear Complex

The Method to Understand the System

Linear systems can be understood by studying the individual part; the whole is the sum of its parts

Nonlinear systems can only be understood by mapping the dependencies and interconnections

System Predictability

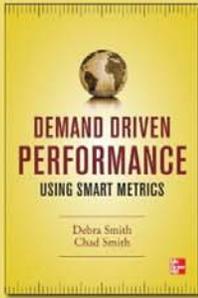
Linear system "state" is stable and predictable

Nonlinear system "state" is dynamic and no predictions remain valid "too" long

System Output Behavior

The output of a linear system is proportional to it's inputs

The output of nonlinear system is governed by a few critical points – the leverer point phenomena



CAS Are Very Different

System Traits

Mathematical Models of the System

Linear
Gaussian statistical model (normal bell shaped distribution curve) - The sum of the averages are a predictable model of the system and the tails of the statistical distribution are ignored as anomalies

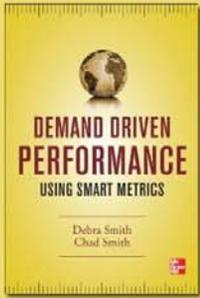
Nonlinear Complex

Paretian statistical model – The tails of the distribution identify the few critical points that define the relevant information predict and manage nonlinear complex systems. They contain the lever point phenomena

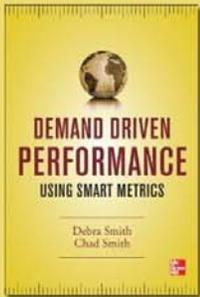
System Output Maximization

A linear system can be optimized

A nonlinear system cannot be optimized but it can continually learn and improve

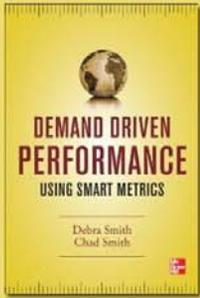


Quantifying the Opportunity



Some Early Adopters





The Gap Formula Between Flow and Cost Centric Strategies

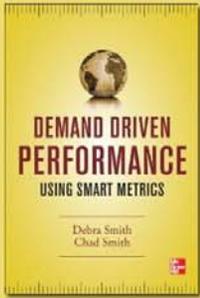
Δ Visibility \rightarrow Δ Variability \rightarrow

Core Conflict Area

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

Plossl's First Law of Manufacturing and the Demand Driven Model

- **Visibility** is defined as relevant information for decision making.
- **Variability** is defined as the summation of the differences between what we plan to have happen and what happens.
- **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 (also known as throughput dollars or contribution margin) minus period operating expense.
- **Net profit/investment** is the equation for ROI.

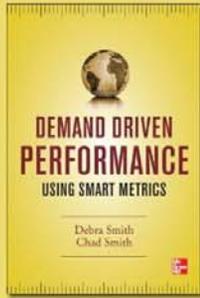


The Major Assumptions Connecting Visibility and Variability

Δ Visibility \rightarrow Δ Variability
Core Conflict Area

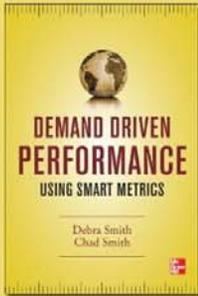
You can't measure or manage what you can't see

- Visibility to the same relevant information across the supply chain ensures:
 - System coherence – the key to synchronizing flow
 - Aligns priorities and schedules
 - Speeds conflict resolution
 - Defines when and where to act
 - People will self organize to solve/act



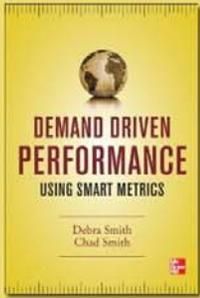
Getting Smarter – A Blueprint for Change

- *Install the Right Thoughtware in the Organization*
- *Become Demand Driven*
- *Deploy Smart Metrics*



IMA Poll Questions 2/13/14

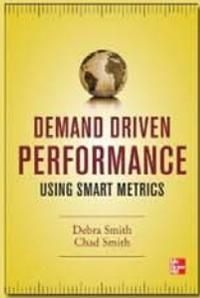
Poll	Poll Question	Poll Responses
	1 What do you think is the biggest factor in ROI?	
	a. Lowest unit cost	12.0%
	b. Best resource efficiency	53.3%
	c. Best total system flow	34.7%
	2 What wins out in your organization?	
	a. Cost centric tactics and actions	38.8%
	b. Flow centric tactics and actions	17.7%
	c. We oscillate back and forth between expediting to protect flow and actions to protect cost	43.4%
	3 How would you describe the complexity of your company's supply chain in the last decade?	
	a. Stayed the same	15.4%
	b. Complexity has increased	78.2%
	c. Complexity has decreased	6.3%
	4 How would you rate your ERP system's ability to focus on the relevant information?	
	a. Poor	22.5%
	b. Moderate	60.8%
	c. Good	16.8%



More Demand Driven Webinars

- **Becoming Demand Driven**
 - The placement of decoupling and control point
 - The use of stock, time and capacity buffers to protect decoupling and control points
 - Supply order generation and resource scheduling
 - Critical metric objectives against the Demand Driven operating model
- **Using Smart Metrics**
 - Making the complex simple to manage
 - The power of Pareto
 - Smart metric objectives

<http://demanddrivenperformance.com/webinars/>



Questions?



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